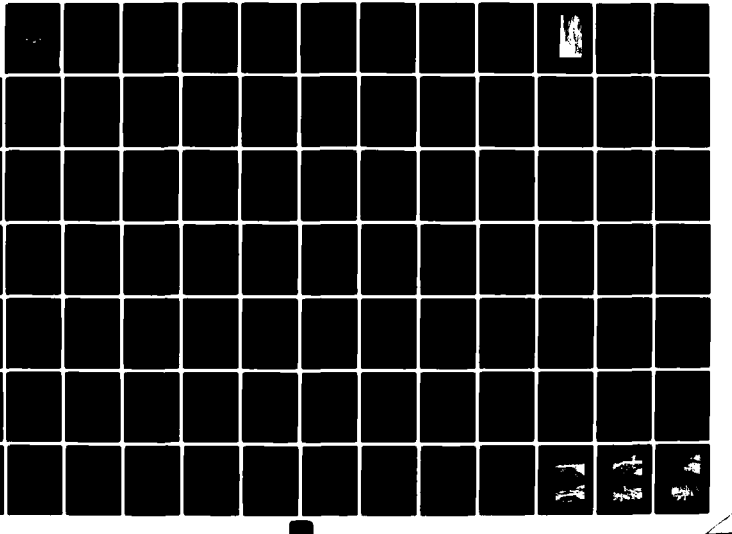
AD-A079 050 GANNETT FLEMING CORDDRY AND CARPENTER INC HARRISBURG PA F/G 13/13
NATIONAL DAM INSPECTION PROGRAM. DAM F (NDI ID NUMBER PA-00642 --ETC(U)
MAY 79 A C HOOKE DACW31-79-C-0015

UNCLASSIFIED NL

1 OF 2
AD-A079050



DELAWARE RIVER BASIN
DRECK CREEK, LUZERNE COUNTY

PENNSYLVANIA

DAM F
NDI ID NO. PA-00642
DER ID NO. 40-13

HAZLETON CITY AUTHORITY
PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

Distribution Unlimited
Approved for Public Release
Contract No. DACW31-79-C-0015

Prepared by
GANNETT FLEMING CORDDRY AND CARPENTER, INC.
Consulting Engineers
Harrisburg, Pennsylvania 17105

DEPARTMENT OF THE ARMY
Baltimore District, Corps of Engineers
Baltimore, Maryland 21203

MAY 1979

DELAWARE RIVER BASIN

DRECK CREEK, LUZERNE COUNTY

PENNSYLVANIA

DAM F

(NDI ID No. PA-00642
DER ID No. 40-13)

~~HAZLETON CITY AUTHORITY~~

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

Prepared by

GANNETT FLEMING CORDDRY AND CARPENTER, INC.
Consulting Engineers
P.O. Box 1963
Harrisburg, Pennsylvania 17105

For

DEPARTMENT OF THE ARMY
Baltimore District, Corps of Engineers
Baltimore, Maryland 21203

May 1979

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

DELAWARE RIVER BASIN

DRECK CREEK, LUZERNE COUNTY

PENNSYLVANIA

DAM F

NDI ID No. PA-00642
DER ID No. 40-13

HAZLETON CITY AUTHORITY

NATIONAL DAM INSPECTION PROGRAM

MAY 1979

CONTENTS

PLATES

APPENDICES

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

BRIEF ASSESSMENT OF GENERAL CONDITION

AND

RECOMMENDED ACTION

Name of Dam:	Dam F NDI ID No. PA-00642/DER ID No. 40-13
Owner:	Hazleton City Authority
State Located:	Pennsylvania
County Located:	Luzerne
Stream:	Dreck Creek
Date of Inspection:	11 April 1979
Inspection Team:	Gannett Fleming Corddry and Carpenter, Inc. Consulting Engineers P.O. Box 1963 Harrisburg, Pennsylvania 17105

Based on visual inspection, available records, calculations, past operational performance, and according to criteria established for these studies, Dam F is judged to be unsafe, nonemergency, because the spillway capacity is rated as seriously inadequate. The spillway can pass 29 percent of the Probable Maximum Flood (PMF) without overtopping of the dam. The Owner has placed sandbags along the spillway crest, which reduces the spillway capacity further. The resulting outflows from the failure of Dam F would overtop and cause the failure of Dam G. This would result in the loss of life. As a whole, the dam is judged to be in fair condition.

There are bulges on the downstream slope that apparently have not stabilized.

The dam has essentially no operational emergency drawdown capability.

Maintenance at the dam is marginal.

The following measures are recommended to be undertaken by the Owner, in approximate order of priority, immediately:

(1) Remove the sandbags from the spillway crest.

(2) Engage the services of a professional engineer experienced in the design and construction of dams to perform the following studies: a study to more accurately determine the spillway capacity required at the dam and the measures required to make the spillway hydraulically adequate, a study to determine the best way of making the outlet works fully operational, and a study to determine the structural factors of safety for the embankment. As a minimum, the studies will require an exploration program to determine the engineering properties of the embankment and foundation soils and information concerning the water level in the embankment, which may be obtained with the observation wells recommended below. Take appropriate action as necessary.

(3) Install ten or more observation wells, or other instrumentation, downstream from the axis of the embankment. Two wells, or other instrumentation, should be located in the vicinity of the seepage area to the right of the outlet works channel. Four others should be in the embankment near the maximum section. The others should be at appropriate locations to determine general water levels in the downstream embankment. Data collected from observation wells or other instrumentation should be utilized in evaluating the stability of the structures and assessing piping potential. Continue to observe wet areas and seepage downstream from the embankment. If conditions worsen, appropriate action should be taken to control seepage with properly designed drains.

(4) Repair the spillway slabs.

(5) Extend the riprap on the upstream slope to the top of the dam.

(6) Monitor by any suitable means the scour, cracking, and deterioration of the concrete spillway walls, the sloughing near the top of the dam, and the heaves on the upstream slope. Take remedial action when needed.

(7) Provide closure facilities for the outlet works pipes upstream of the concrete core-wall for periodic inspection and for use in the event the pipes leak severely, thereby endangering the embankment.

(8) Remove the brush from the embankment slopes and the trees from near the downstream toe.

In addition, the Owner should institute the following operational and maintenance procedures:

(1) Develop a detailed emergency operation and warning system for Dam F.

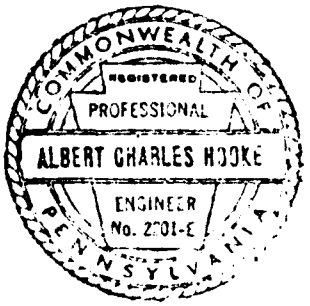
(2) During periods of unusually heavy rains, provide round-the-clock surveillance of Dam F. Have sufficient personnel available to remove debris that may collect at the spillway bridge.

(3) When warnings of a storm of major proportions are given by the National Weather Service, the Owner should activate his emergency operation and warning system.

(4) Institute an inspection program such that the embankment is inspected frequently. The program should include a formal annual inspection by a professional engineer experienced in the design and construction of dams. Utilize the results to determine if remedial measures are necessary.

(5) Institute a maintenance program to properly maintain all features of the dam.

Submitted by:



GANNETT FLEMING CORDDRY
AND CARPENTER, INC.

A. C. HOOKE
Head, Dam Section

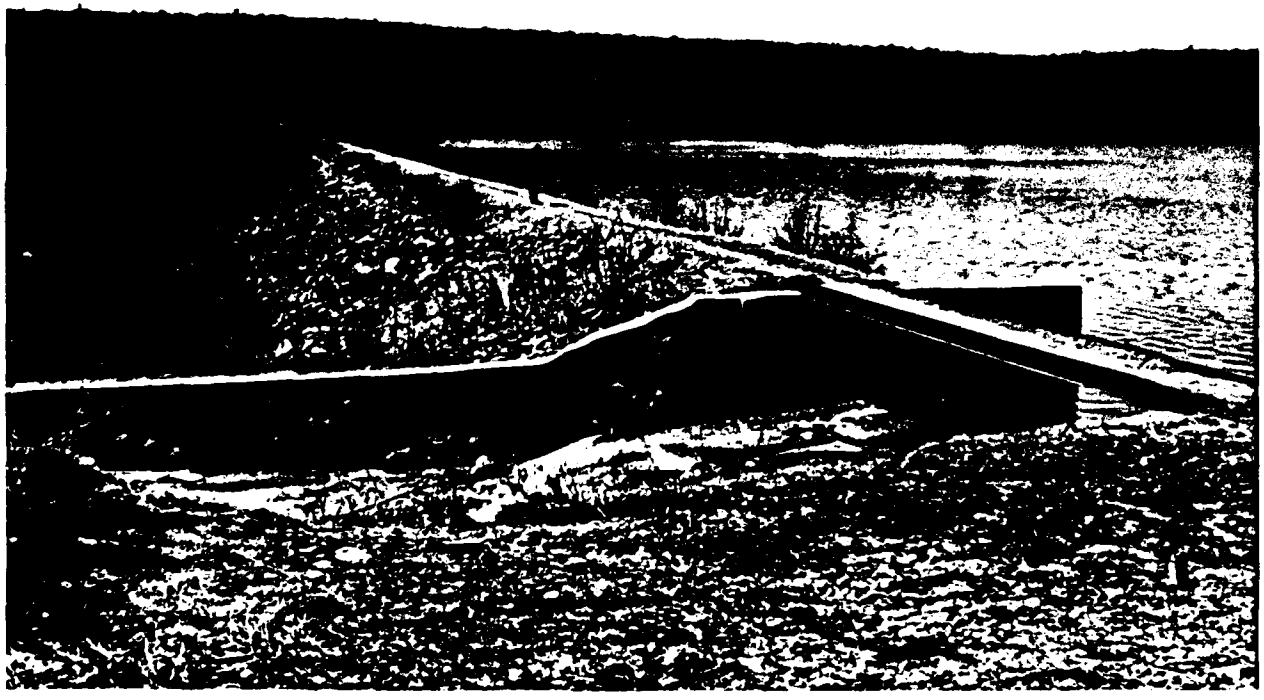
Date: 22 June 1979

Approved by:

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, CORPS OF ENGINEERS

JAMES W. PECK
Colonel, Corps of Engineers
District Engineer

DAM F



Overview

DELAWARE RIVER BASIN

DRECK CREEK, LUZERNE COUNTY

PENNSYLVANIA

DAM F

NDI ID No. PA-00642
DER ID No. 40-13

HAZLETON CITY AUTHORITY

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

MAY 1979

SECTION 1

PROJECT INFORMATION

1.1 General.

a. Authority. The Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of inspection of dams throughout the United States.

b. Purpose. The purpose of the inspection is to determine if the dam constitutes a hazard to human life or property.

1.2 Description of Project.

a. Dam and Appurtenances. Dam F is a homogeneous earthfill embankment with a concrete core-wall.

The embankment is 830 feet long and 31 feet high at maximum section. The outlet works, which is near the middle of the embankment, consists of a concrete intake structure, two 24-inch diameter cast-iron pipes, a valve house, and an outfall.

The concrete chute spillway is at the left abutment of the dam. Its crest is 4.5 feet below the design elevation of the top of the dam and is 29 feet long. The approach channel is short and concrete-paved. The exit channel is a continuation of the chute. A bridge extends across the spillway crest. The various features of the dam are shown on the Plates at the end of the report and on the Photographs in Appendix D.

b. Location. The dam is located on Dreck Creek, approximately 3.6 miles east of Hazleton, Pennsylvania. Dam F is shown on USGS Quadrangle, Hazelton, Pennsylvania, with coordinates N40° 56'55" and W75° 54'35" in Luzerne County, Pennsylvania. Dam G is located downstream from Dam F on Dreck Creek, 0.3 mile east of Dam F. A location map is shown on Plate 1.

c. Size Classification. Small (31 feet high, 885 acre-feet).

d. Hazard Classification. High hazard. Downstream conditions indicate that a high hazard classification is warranted for Dam F (Paragraph 5.1c.).

e. Ownership. Hazleton City Authority, Hazleton, Pennsylvania.

f. Purpose of Dam. Water supply for Hazleton.

g. Design and Construction History. Dam F was constructed between 1910 and 1916. The dam was designed by S. D. Warriner, A. B. Jessup, Edgar Kudlich, W. H. Davies, J. H. Humphrey, and A. H. Lewis. All these gentlemen were staff members of the Hazleton Water Company, the original owner. The contractor was the Read Contracting Company. J. W. Ledoux, a consulting engineer of Philadelphia, was retained by the Water Company when the dam was under construction. He recommended both raising the top elevation 10 feet to its present design elevation and modifying the spillway to its present design configuration.

The dam was almost complete when the Commonwealth enacted the permit requirement for constructing dams. The dam was studied, when still under construction, by the Pennsylvania Water Supply Commission as part of their 1914 dam inspection report. The study recommended the issuing of a permit without any modifications to the dam.

At some later date, a reducer was added at the outfall of the left outlet works pipe. The bridge across the spillway was constructed at an unknown date, but before 1965.

Tropical Storm Agnes, in June 1972, caused scour and erosion at the spillway chute. Gannett Fleming Corddry and Carpenter, Inc., prepared plans in 1973 for emergency repairs to the spillway. The repairs are discussed in Section 6.

h. Normal Operational Procedure. The pool is maintained at the top of the sandbags on the spillway crest with excess inflow discharging over the spillway. Releases from the outlet works, as well as spillway discharges, flow downstream to Dam G.

1.3 Pertinent Data.

a. Drainage Area. (square miles) 2.4

b. Discharge at Damsite. (cfs.)

Maximum known flood at damsite	Unknown
Outlet works at maximum pool elevation	
Left Outlet	4
Right Outlet	68
Total	72
Spillway capacity at maximum pool elevation	
Design Conditions	860
Existing Conditions	830

c. Elevation. (feet above msl.)

Top of dam	1614.5
Maximum pool	1614.5
Normal pool (spillway crest)	1610.0
Upstream invert outlet works	1584.8

c.	Elevation. (feet above msl.) (cont'd.)	
	Downstream invert outlet works	
	Left Outlet	1583.6
	Right Outlet	1593.1
	Streambed at toe of dam	1583.6
d.	Reservoir Length. (miles.)	
	Normal pool	0.76
	Maximum pool	0.92
e.	Storage. (acre-feet)	
	Normal pool	589
	Maximum pool	885
f.	Reservoir Surface (acres.)	
	Normal pool	64
	Maximum pool	68
g.	Dam.	
	Type	Homogeneous earthfill with concrete core-wall.
	Length (feet)	830
	Height (feet)	31
	Topwidth (feet)	Varies, 6 to 10
	Side Slopes	
	Design	
	Upstream	1V on 2H
	Downstream	1V on 1.67H
	Existing Conditions	
	Upstream	1V on 2.1H
	Downstream	1V on 1.75H
	Zoning	Core-wall

	Cut-off	Core-wall founded in cut-off trench, timber sheeting beneath.
	Grout Curtain	None.
h.	Diversion and Regulating Tunnel.	None.
i.	Spillway.	
	Type	Concrete chute.
	Length of Weir (feet)	
	Design	30.0
	Existing	29.0
	Crest Elevation	1610.0
	Upstream Channel	Short concrete-paved section with vertical concrete walls
	Downstream Channel	Chute extends to Dam G reservoir downstream.
j.	Regulating Outlets.	
	Type	Two 24-inch diameter cast-iron pipes (CIP). Left outlet reduces to 6-inch diameter at toe.
	Length (feet).	
	Left Outlet	151
	Right Outlet	114

j. Regulating Outlets. (cont'd.)

Closure	Valve house at downstream toe.
Access	Over embankment slope to valve house at toe.

SECTION 2

ENGINEERING DATA

2.1 Design.

a. Data Available. No engineering data were available for review for the structure as originally designed. In a study performed in 1914 by the Pennsylvania Water Supply Commission an account of design concepts, geology, construction materials and methods, and design features was prepared for the components of the dam from interviews with the Owner, visual inspection, and other sources. The 1914 study also included analyses for hydrology and hydraulics. A summary of the results of the analyses is on file.

b. Design Features. The project is described in Paragraph 1.2g. The various features of the dam are shown on the Plates at the end of the Report and on the Photographs in Appendix D. The embankment is shown on Plates 2 and 4 and on Photographs A, B, C, and D. The spillway is shown on Plate 2 and on Photographs G, H, I, and J. The outlet works is shown on Plates 4 and 5 and on Photographs E and F. No plans are available for the reducer added to the left outlet works pipe.

c. Design Considerations. There are insufficient data to assess the design.

2.2 Construction.

a. Data Available. Construction data for the original structure that are available for review, consists of the information contained in the 1914 Report prepared by the Pennsylvania Water Supply Commission. The information is relatively well detailed. The report states that the embankment is constructed of a sandy and gravelly clay, with stones larger than 6-inches removed, that was sprinkled and then compacted by the earth-moving equipment. The concrete core-wall is reportedly founded in a trench 4 to 5.5 feet deep. Timber

sheeting was driven 4 to 5 feet below the bottom of the trench. The core-wall was placed around the timber, which protrudes 3 feet into the core-wall. A water-proofing compound was placed on the upstream face of the core-wall. A pocket of gravel discovered upstream of the core-wall was excavated and filled with impervious material.

b. Construction Considerations. The available information indicates that the dam was well constructed. Although the embankment could have been compacted better, it has existed for 63 years without any reported problems.

2.3 Operation. There are no formal records of operation. The Owner did not report any problems having occurred over the operational history of the dam, except for damage to the spillway chute during Tropical Storm Agnes.

2.4 Evaluation.

a. Availability. Engineering data were provided by the Bureau of Dam Safety, Obstructions, and Storm Water Management, Department of Environmental Resources, Commonwealth of Pennsylvania, and by the Owner, Hazleton City Authority. The Owner made available The General Manager for information during the week of the visual inspection. He also researched his files for further information at the request of the inspection team.

b. Adequacy. The type and amount of design data and other engineering data are limited, and the assessment must be based on the combination of available data, visual inspection, performance history, hydrologic assumptions, and hydraulic assumptions.

c. Validity. There is no reason to question the validity of the available data.

SECTION 3

VISUAL INSPECTION

3.1 Findings.

a. General. The overall appearance of the dam is fair. Deficiencies were observed as noted below. A sketch of the dam with the location of deficiencies is presented in Appendix B on Plate B-1. Survey information acquired for this report is summarized in Appendix B. On the day of the inspection, the pool was 0.5 foot above spillway crest.

b. Embankment. The riprap on the upstream slope is in good condition. There is minor heaving of the riprap along the upstream slope. The riprap terminates 0.9 foot below the design top of dam elevation (Photograph A). Above the top of the riprap, the soil is soft and minor shallow sloughing has occurred all along the top. This sloughing was also observed at areas along the downstream edge of the top of the dam, where the riprap also terminates 0.9 foot below the design top elevation (Photograph C). The measured topwidth varies between 6 and 10 feet. Thick brush covers areas of the downstream slope. Mature trees are growing at the toe of the dam (Photograph C). Areas of the downstream slope are bulged and heaved (Photograph D). Smooth heaves start about 400 feet to the right of the outlet works and continue to the left. The heaves appear as 1-foot high ripples on the slope. The heaves transition to bulges about 140 feet to the right of the outlet works. The bulges have a much more peaked appearance. They extend all the way to the spillway at the left abutment. The largest bulge was estimated to be about 4 feet high. The heaves and bulges are generally near the toe of the slope.

Seepage and wet areas were observed immediately downstream of the toe. A hole about 1.5 feet deep, with standing water, is about 150 feet from the right abutment. Another, about 50 feet to the left and about 4 feet deep, also has standing water. A dry flow path starts near this second hole and extends for about 30 feet to an area seeping clear water at about 2 gpm. This joins water from other seepage areas until, near the outlet works, the total seepage is about 20 to 30 gpm. There are also soft and wet areas near the left abutment where the embankment abuts the spillway. The seepage from this area is clear and is estimated at 1 gpm. The downstream toe at the maximum section of the dam is a swamp created by the reservoir of Dam G immediately downstream (Photograph E). All the seepage that was observed flows into this swamp. Seepage through or under this swamp would discharge into it and would not be observable. Heavy rains, which occurred two days prior to the inspection, may have contributed significantly to the seepage. All the seepage areas are sketched on Plate B-1.

A survey performed for this inspection revealed that the embankment is above its design elevation and that the upstream slope agrees approximately with the design slope of 1V on 2H. The downstream slope of 1V on 1.75H is slightly flatter the design slope of 1V on 1.67H.

c. Appurtenant Structures. The outlet works appears in poor condition (Photograph E). The left outlet pipe is used by the Owner to regulate inflow to Dam G, if required. It is operated by a handle, which extends through the roof of the valve house. This line is provided with a reducer. The reduced line extends to a spray-like device just downstream of the outlet works stilling basin. The reducer has a small leak. The right line is arranged as shown on Plate 5. There does not appear to be any ready access to the valve on this line. The roof on the valve house is near collapse; it would have to be removed to gain access to the right line valve. This valve either leaks or is cracked open, as a small flow is discharging from the line. The walls of the concrete valve house are severely deteriorated (Photograph F). The Owner declined to operate the outlet works valve out of concern the valve would remain in the open position.

Although the spillway is in fair structural condition, the Owner has placed sandbags across the spillway crest (Photograph H). The sandbags are piled 0.5 to 0.7 feet high. The approach walls and training walls immediately downstream of the crest are covered with shotcrete (Photograph G). These walls have a minor amount of shrinkage cracks. One area of the wall shows evidence of relative movement. As the offset is covered with shotcrete, the movement is obviously not recent. Immediately downstream of the spillway crest, the slab is severely scoured (Photograph H). Further downstream, the slab is less severely scoured. The walls evidence minor signs of distress. The areas are sketched in Appendix B.

The spillway crest measured 29 feet. This is 1 foot shorter than the design crest length. A bridge extends across the spillway crest. Its low steel is at the design top of dam elevation (Photograph H). The bridge deck is beginning to deteriorate.

d. Reservoir Area. Most of the watershed is owned by Hazleton City Authority. The USGS mapping indicates strip mining in a minor portion of the watershed fringe. The remainder of the watershed is fairly steep hills; it is wooded and almost entirely undeveloped except along a public road, where the development is minor. The submerged remains of Dam K were observed in the reservoir. The records state that Dam K was breached and abandoned when Dam F reservoir was filled. The access road to Dam F extends along the left bank of the reservoir and is high above it.

e. Downstream Conditions. Immediately downstream of Dam F is Dam G, whose reservoir is at the toe of Dam F (Photograph E). The stream extends along an uninhabited reach for 5.5 miles from Dam G to the community of Weatherly, where at least 40 dwellings are within the flood plain.

SECTION 4

OPERATIONAL PROCEDURES

4.1 Procedure. The reservoir is maintained at the top of the sandbags on the spillway crest, with excess inflow discharging over the spillway and into Dam G reservoir. A 24-inch diameter cast-iron water supply line reduced to a 6-inch diameter line, discharges into Dam G Reservoir. Since inflow to Dam G is continually required for water supply purposes,the valve on the Dam F left water discharge line is usually operated in the throttled position. The valve on the right line is usually closed.

4.2 Maintenance of Dam. The dam is visited daily by a caretaker who adjusts the left discharge line valve, if necessary. Inspections of the dam are not made. Brush is cut at irregular intervals.

4.3 Maintenance of Operating Facilities. The left outlet works valve is operated when required. The right outlet works valve is not maintained.

4.4 Warning Systems in Effect. The Owner stated that there is no emergency operation and warning system. He stated that, should the dam fail, no damage would result downstream.

4.5 Evaluation Of Operational Adequacy. The maintenance of the embankment and spillway is marginal. The maintenance of the outlet works is poor. Inspections are necessary to detect hazardous conditions at the dam. As described hereafter, the failure of the dam would result in damage. An emergency operation and warning system is necessary to mitigate the hazards downstream, should evidence of stress become evident at the dam.

SECTION 5

HYDROLOGY AND HYDRAULICS

5.1 Evaluation of Features.

a. Design Data. No data were available for review for the structure as originally designed or for the modifications made during construction. During 1914, a report on the dam was prepared by the Pennsylvania Water Supply Commission. The report estimated the maximum spillway capacity at 860 cfs. The spillway capacity used in this report is in agreement with the above figure, except it was adjusted to 830 cfs to account for the reduced crest length (Appendix C).

b. Experience Data. The Owner stated that no records of maximum pool levels were available. As noted in Paragraph 1.2g, Tropical Storm Agnes caused substantial damage to the spillway. Although this is probably the flood of record, there is insufficient information to estimate the flow.

c. Visual Observations.

(1) General. The visual inspection of Dam F, which is described in Section 3, resulted in a number of observations relevant to hydrology and hydraulics. These observations are evaluated herein for the various features.

(2) Embankment. The riprap being below the top of the dam is an erosion hazard when the pool is above spillway crest elevation.

(3) Appurtenant Structures. As noted in Appendix C, the discharge capacity of the left outlet works line is 4 cfs. As there is no evidence to suggest that the right outlet works line is operational, the dam must be considered to have essentially no operational emergency drawdown capability. Both the outlet works pipes extend under pressure through the embankment without upstream closure facilities.

The Owner stated that the sandbags provide additional storage for periods when the system runs low on water. He considered this a "slight" deviation from approved operating practice. The sandbags are a serious hazard to the dam because they significantly reduce the spillway capacity. The bridge across the spillway crest has the potential to collect debris, which would further reduce the spillway capacity.

(4) Reservoir Area. The strip mine covers a sufficiently small part of the watershed that it will have a negligible effect on the hydrology. The effects of Dam K have been ignored in the analysis described hereafter. Access to Dam F is good. The records state that the drainage area of Dam F is 2.1 square miles. This estimate dates from 1914 or earlier. More recent USGS mapping was used to determine the 2.4 square miles used in this report. The assessment of the dam is based on existing conditions, and the effects of future development are not considered.

(5) Downstream Conditions. No conditions were observed downstream from the dam that might present significant hydraulic hazard to the dam. A Phase I Report for the National Dam Inspection Program is concurrently being prepared for Dam G. In that report, the spillway of Dam G, which is a high hazard, small size dam, is rated as seriously inadequate. A failure of Dam G could cause damage downstream in the community of Weatherly. Because failure of Dam F would cause failure of Dam G, a high hazard classification is warranted for Dam F.

d. Overtopping Potential.

(1) Spillway Design Flood. According to the criteria established by the Office of the Chief of Engineers (OCE), the Spillway Design Flood (SDF) for the size (Small) and hazard potential (High) of Dam F is between the Probable Maximum Flood (PMF) and the 1/2 PMF. Because the SDF for Dam G is the PMF, the PMF is selected as the SDF for Dam F.

(2) Description of Model. The watershed was modeled with the HEC-1DB computer program. The HEC-1DB computer program computes a PMF runoff hydrograph and routes the flows through both reservoirs and stream sections. In addition, it has the capability to simulate an overtopping dam failure. The PMF inflow to Dam F reservoir was routed through the dam. Identical methods were used for various percentages of the PMF.

(3) Summary of Results. Pertinent results are tabularized at the end of Appendix C. The analysis reveals that Dam F can pass about 29 percent of the PMF without overtopping. The dam is rated at its design top elevation. The above figure does not include the effects of the sandbags in the spillway. The actual percentage is significantly lower.

(4) Spillway Adequacy. The criteria for rating a spillway is presented in Appendix C. Dam F would be overtopped by 0.53 foot during the 1/2 PMF. This would probably cause the embankment to fail. The embankment was assumed to fail over a 85-foot long breach 0.2 hour after the dam would be overtopped by 0.1 foot. The breach was assumed to extend down to Elevation 1584.0. A breach of this size will result in a peak outflow of 50,570 cfs. This flow was routed into Dam G Reservoir. The failure of Dam G would be almost simultaneous. The flows were then routed downstream to Weatherly. The combined failure of Dam F and Dam G will raise the water surface in Weatherly by 8.6 feet above the water surface were no failure to occur. There is an increased hazard to loss of life. The spillway capacity of Dam F is rated as seriously inadequate.

SECTION 6

STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability.

a. Visual Observations.

(1) General. The visual inspection of Dam F, which is described in Section 3, resulted in a number of observations relevant to structural stability. These observations are evaluated herein for the various features.

(2) Embankment. An inspection by the Commonwealth in 1928 noted that fill had recently been placed on the top of the dam. It is surmised that uncompacted soil was placed along the top of dam to fill in low areas and that an amount of overbuild was provided. This is probably the reason why the embankment is above its design elevation, minor sloughing occurred, and the existing top width varies. These conditions are not of particular concern. The brush on the slopes and the trees along the toe are undesirable. The bulges and heaves on the downstream slope are of concern. A 1928 inspection report by the Commonwealth noted that the paving on both slopes had just been relaid. The present bulges were first noted in an inspection by the Commonwealth in 1944. In that inspection report, the bulges were described as extending over a 50-foot length near the outlet works. Repairs were ordered, but apparently never accomplished. The present bulges are much more extensive. The heaves on the upstream slope are probably caused by poor construction grading; they are not of particular concern.

The seepage downstream from the dam is substantial. Furthermore, the Dam G reservoir covers the area where the most seepage would be expected. To properly monitor seepage in this section of the embankment, instrumentation would be required.

(3) Appurtenant Structures. Most of the conditions at the outlet works are assessed in Section 5. The deterioration of the valve house is probably caused by a poor mix of concrete and a lack of maintenance. The Owner reported that the reservoir water is very acid, which may be another contributing factor.

The scour observed at the spillway is an indication of the lack of maintenance. A review of the periodic inspections by the Commonwealth indicate that severe deterioration of the concrete had been continuing for many years before Tropical Storm Agnes. The plans prepared by Gannett Fleming Corddry and Carpenter, Inc. (GFCC) to repair the damage caused by that storm indicated that scour holes in the slab from 20 to 90 feet downstream from the spillway crest were to be filled and that the slab from 90 to 150 feet downstream from the spillway crest was to be replaced. No repairs to the walls were indicated on the plans. The slab that was replaced is in good condition. The slab that was repaired is scoured, but not severely. The slab upstream of the repaired section is severely scoured. A discussion with GFCC's project manager indicated that this area was not scoured immediately after Tropical Storm Agnes. The scour is apparently recent. The shotcrete on the spillway walls is in good condition. The shrinkage cracking, minor bulging at one area, and leaching at another is not an immediate hazard to the dam. However, it is surmised that the shotcrete is 6 inches thick on each wall, which accounts for the 1 foot reduction from the design crest length.

The deterioration of the bridge slab is not a hazard to the dam at present. Further deterioration could hinder access.

b. Design and Construction Data. No stability analysis for the embankment is available. Analysis of the embankment stability is beyond the scope of this study. The bulges and heaves on the embankment have apparently not stabilized.

c. Operating Records. There are no formal records of operation. No evidence of instability on any feature of the dam has been noted, except for the bulges on the downstream embankment slope.

d. Post-construction Changes. There have been no post-construction changes to Dam F that would affect its stability.

e. Seismic Stability. Dam F is located in Seismic Zone 1. Normally it can be considered that if a dam in this zone has adequate factors of safety under static loading conditions, it can be assumed safe for any expected earthquake loading. However, since there are no formal static stability analyses, and there is the potential of earthquake forces moving or cracking the concrete core-wall, the theoretical seismic stability of Dam F cannot be assessed.

SECTION 7

ASSESSMENT, RECOMMENDATIONS, AND REMEDIAL MEASURES

7.1 Dam Assessment.

a. Safety.

(1) Based on available records, visual inspection, calculations, and past operational performance, Dam F is judged to be in fair condition. The spillway will pass only 29 percent of the PMF without overtopping of the dam. The Owner has placed sandbags along the spillway crest, which reduce the spillway capacity further. If the dam should fail, the resulting outflow would overtop and cause the failure of the high hazard Dam G downstream. This would result in a loss of life. The spillway capacity is rated as seriously inadequate. According to criteria established for these studies, the dam must be rated as unsafe, nonemergency, because the spillway capacity is seriously inadequate.

(2) There are bulges on the downstream embankment slope that apparently have not stabilized.

(3) The dam has essentially no operational emergency drawdown capability.

(4) Maintenance at the dam is marginal.

(5) A summary of the features and observed deficiencies is listed below:

Feature and Location	Observed Deficiencies
Embankment:	
Upstream slope	Minor heaves riprap does not extend to the top of the dam, brush.

Feature And Location	Observed Deficiencies
Embankment:	
Top	Sloughing at edges.
Downstream Slope	Heaves and bulges, brush.
Toe	Trees, seepage.
Outlet Works:	
Valve pit	Deteriorated, roof near collapse.
Pipes	No access to right line valve, pipes under pressure through embankment.
Spillway	
Weir	Sandbags along crest.
Channel	Scour in chute, minor deficiencies along wall.

b. Adequacy of Information. The information available is such that an assessment of the condition of the dam can be inferred from the combination of visual inspection, past performance, and computations performed prior to and as part of this study.

c. Urgency. The recommendations in Paragraph 7.2 should be implemented immediately.

d. Necessity for Further Investigations. In order to accomplish some of the remedial measures outlined in Paragraph 7.2, further investigations by the Owner will be required.

7.2 Recommendations and Remedial Measures.

a. The following measures are recommended to be undertaken by the Owner, in approximate order of priority, immediately:

(1) Remove the sandbags from the spillway crest.

(2) Engage the services of a professional engineer experienced in the design and construction of dams to perform the following studies: a study to more accurately determine the spillway capacity required at the dam and the measures required to make the spillway hydraulically adequate, a study to determine the best way of making the outlet works fully operational, and a study to determine the structural factors of safety for the embankment. As a minimum, the studies will require an exploration program to determine the engineering properties of the embankment and foundation soils and information concerning the water level in the embankment, which may be obtained with the observation wells recommended below. Take appropriate action as necessary.

(3) Install ten or more observation wells, or other instrumentation, downstream from the axis of the embankment. Two wells, or other instrumentation, should be located in the vicinity of the seepage area to the right of the outlet works channel. Four others should be in the embankment near the maximum section. The others should be at appropriate locations to determine general water levels in the downstream embankment. Data collected from observation wells or other instrumentation should be utilized in evaluating the stability of the structures and assessing piping potential. Continue to observe wet areas and seepage downstream from the embankment. If conditions worsen, appropriate action should be taken to control seepage with properly designed drains.

(4) Repair the spillway slabs.

(5) Extend the riprap on the upstream slope to the top of the dam.

(6) Monitor by any suitable means the scour, cracking, and deterioration of the concrete spillway walls, the sloughing near the top of the dam, and the heaves on the upstream slope. Take remedial action when needed.

(7) Provide closure facilities for the outlet works pipes upstream of the concrete core-wall for periodic inspection and for use in the event the pipes leak severely, thereby endangering the embankment.

(8) Remove the brush from the embankment slopes and the trees from near the downstream toe.

b. In addition, the Owner should institute the following operational and maintenance procedures:

(1) Develop a detailed emergency operation and warning system for Dam F.

(2) During periods of unusually heavy rains, provide round-the-clock surveillance of Dam F. Have sufficient personnel available to remove debris that may collect at the spillway bridge.

(3) When warnings of a storm of major proportions are given by the National Weather Service, the Owner should activate his emergency operation and warning system.

(4) Institute an inspection program such that the embankment is inspected frequently. The program should include a formal annual inspection by a professional engineer experienced in the design and construction of dams. Utilize the results to determine if remedial measures are necessary.

(5) Institute a maintenance program to properly maintain all features of the dam.

DELAWARE RIVER BASIN

DRECK CREEK, LUZERNE COUNTY

PENNSYLVANIA

DAM F

NDI ID No. PA-00642
DER ID No. 40-13

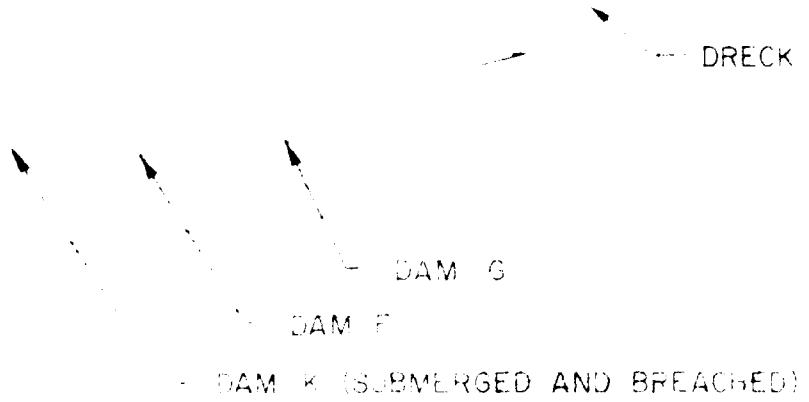
HAZLETON CITY AUTHORITY

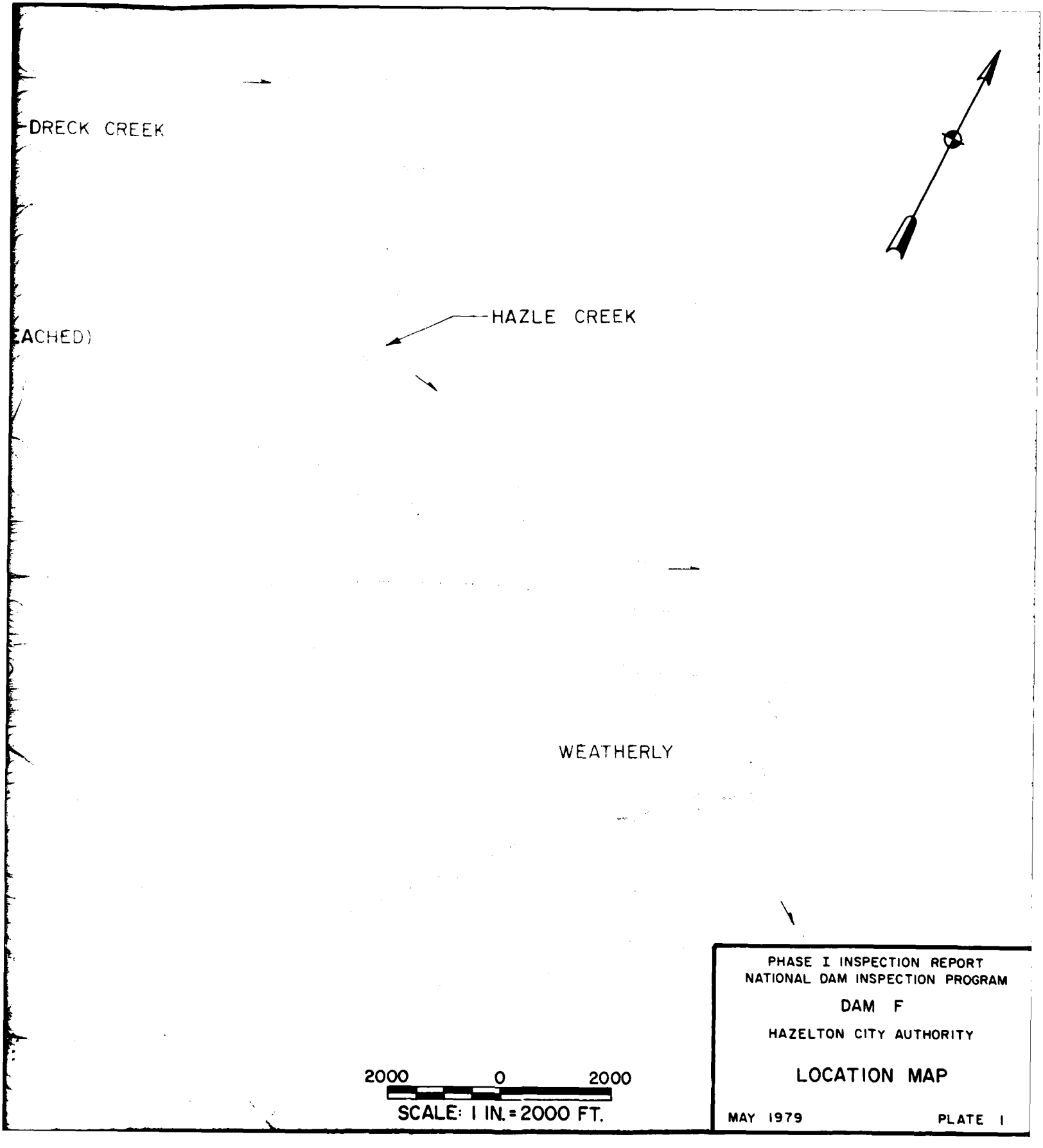
PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

MAY 1979

PLATES


DRECK CREEK
DAM G
DAM F
DAM K (SUBMERGED AND BREACHED)



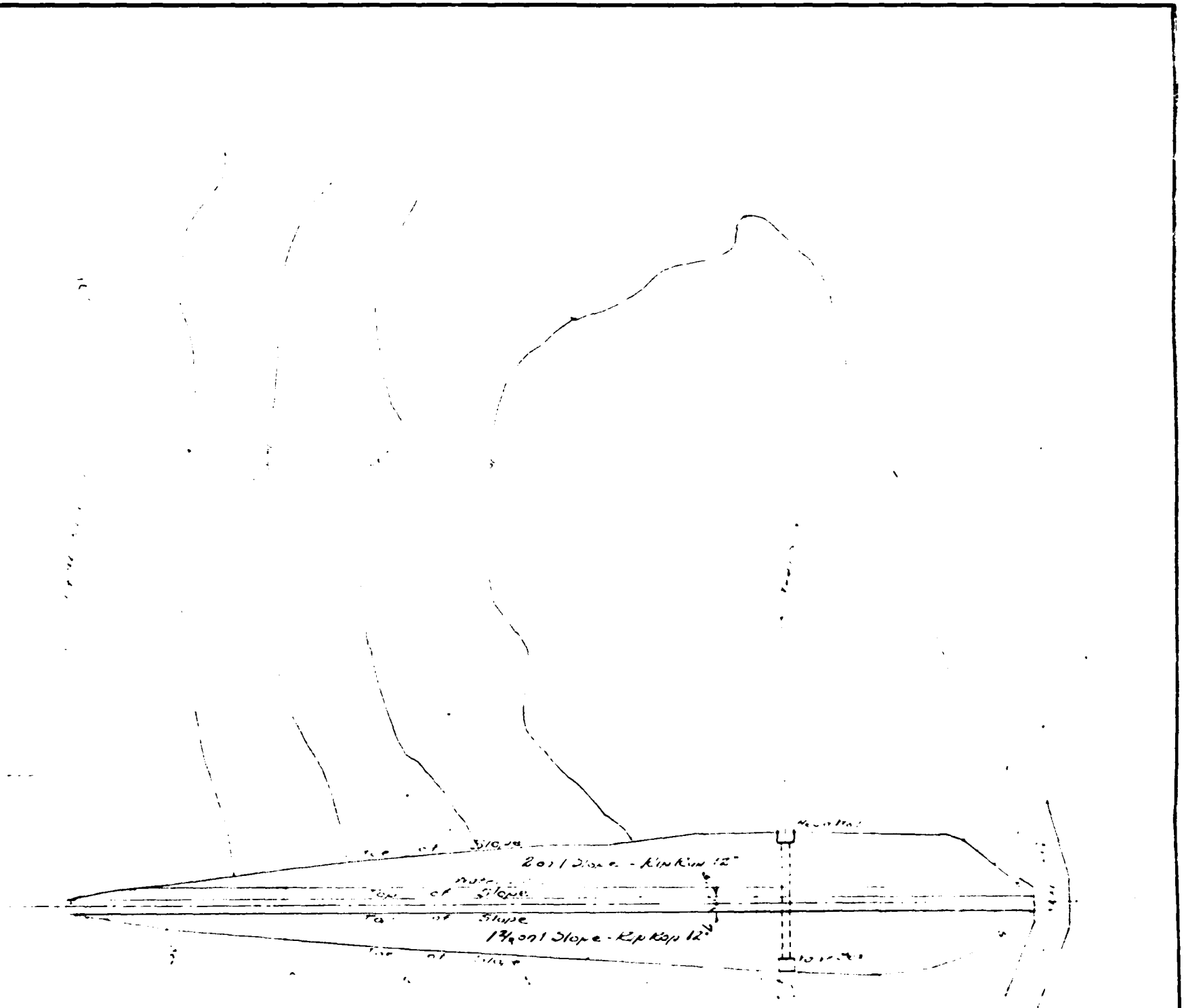
PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

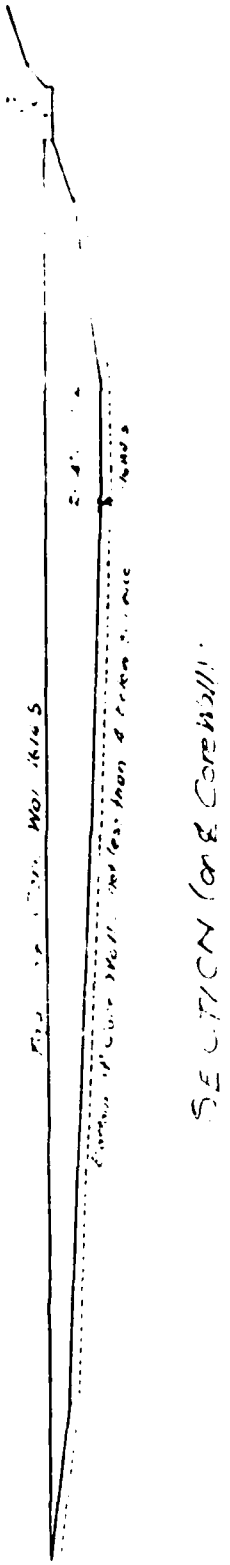
DAM F

HAZELTON CITY AUTHORITY

LOCATION MAP

MAY 1979 PLATE 1


2 on 1 Slope - Rip Rap 12"
1¾ on 1 Slope - Rip Rap 12"



SECTION (on E. Core Wall)

Hazleton Water Co.,
Wyoming Valley Water Supply Co., Lessee,
DRIFTON CREEK - RESERVOIR F-
PLAN & SECTION OF DAM
Scale 1" = 100'
Hazleton Pa. 1-13-14

Approved -

Engineer

SECTION (on E Core Wall)

Hazleton Water Co.,
Wyoming Valley Water Supply Co., Lessee,
[illegible] CREEK - RESERVOIR F -
PLAN & SECTION OF DAM
Scale 1" = 100'
[illegible] from Pl. 1-13-14

Approved -

Engineer

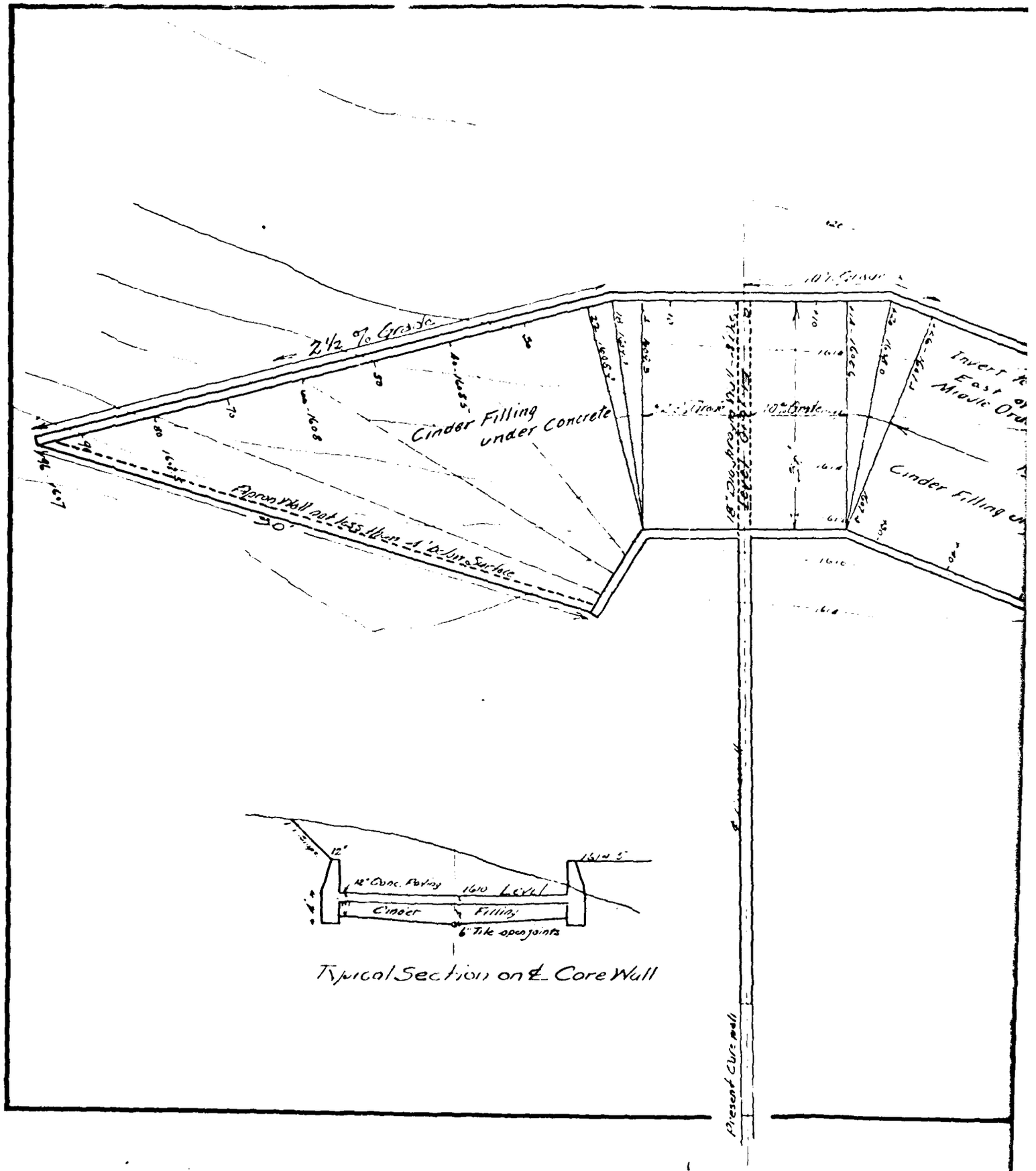
PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DAM F

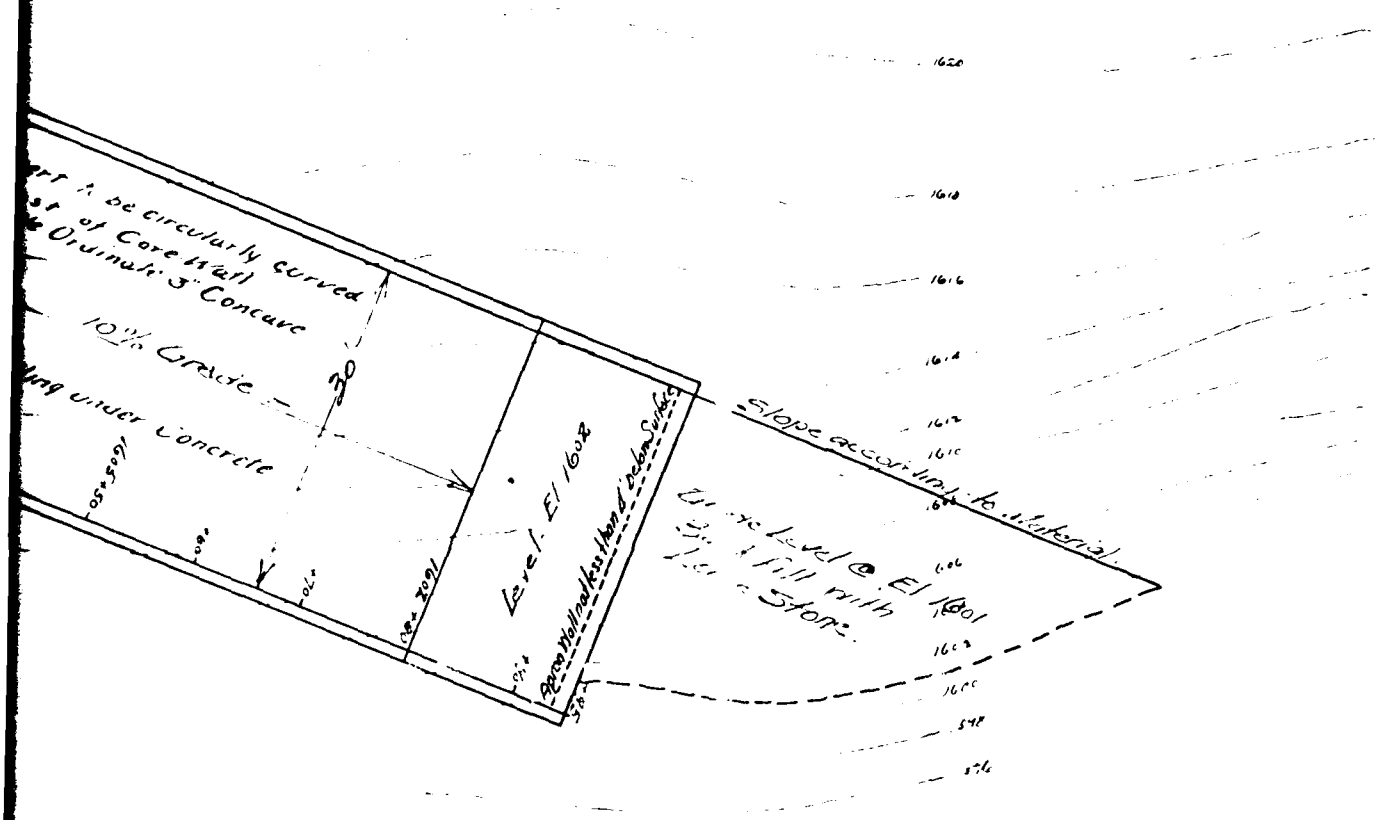
HAZELTON CITY AUTHORITY

PLAN

MAY 1979 PLATE 2



Typical Section on ℄ Core Wall



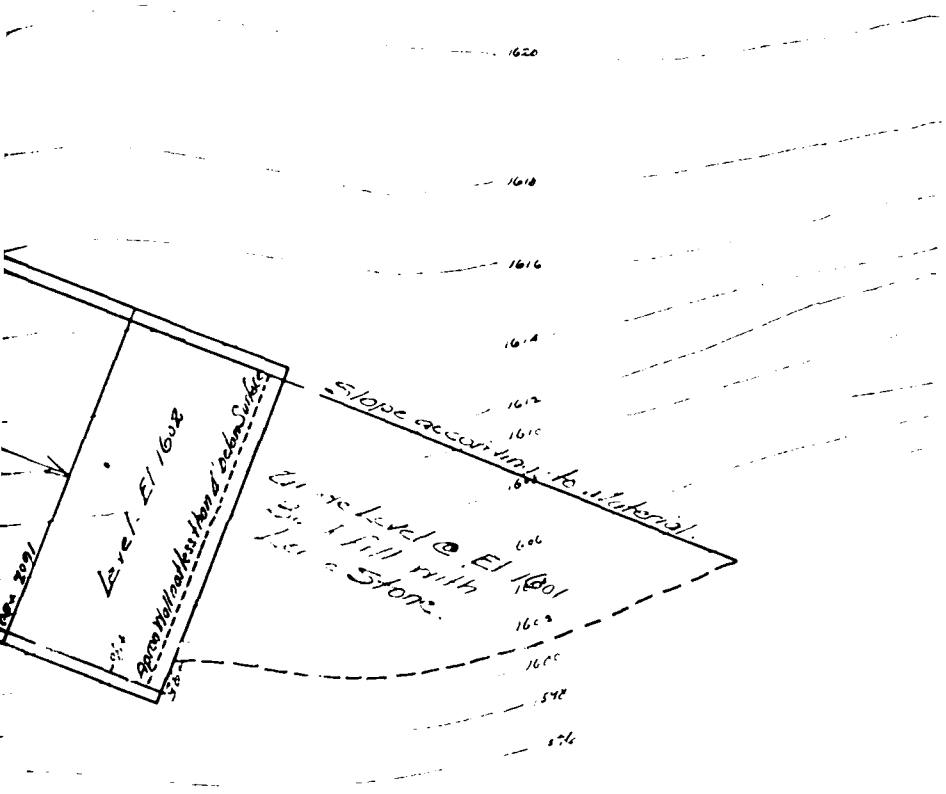
Hazelton Water Co.,
Wyoming Valley Water Supply Co Lessee,
Hazleton District
Breck Creek Reservoir 'F'
Proposing Change-North Overflow.
Scale 1"
Hazleton 9-29-13
Revised per Engineer by Hazleton 11-21-13

PHASE
NATIONAL

HAZE

MAY 1979

V



Hazelton Water Co.,
Wyoming Valley Water Supply Co Lessee,
Hazelton District
Dreck Creek Reservoir 'F'
Proposing Change-North Overflow.
Scale 1"
Plotted 9-29-13
Revised per suggestion by Wm Engr 11-21-13

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

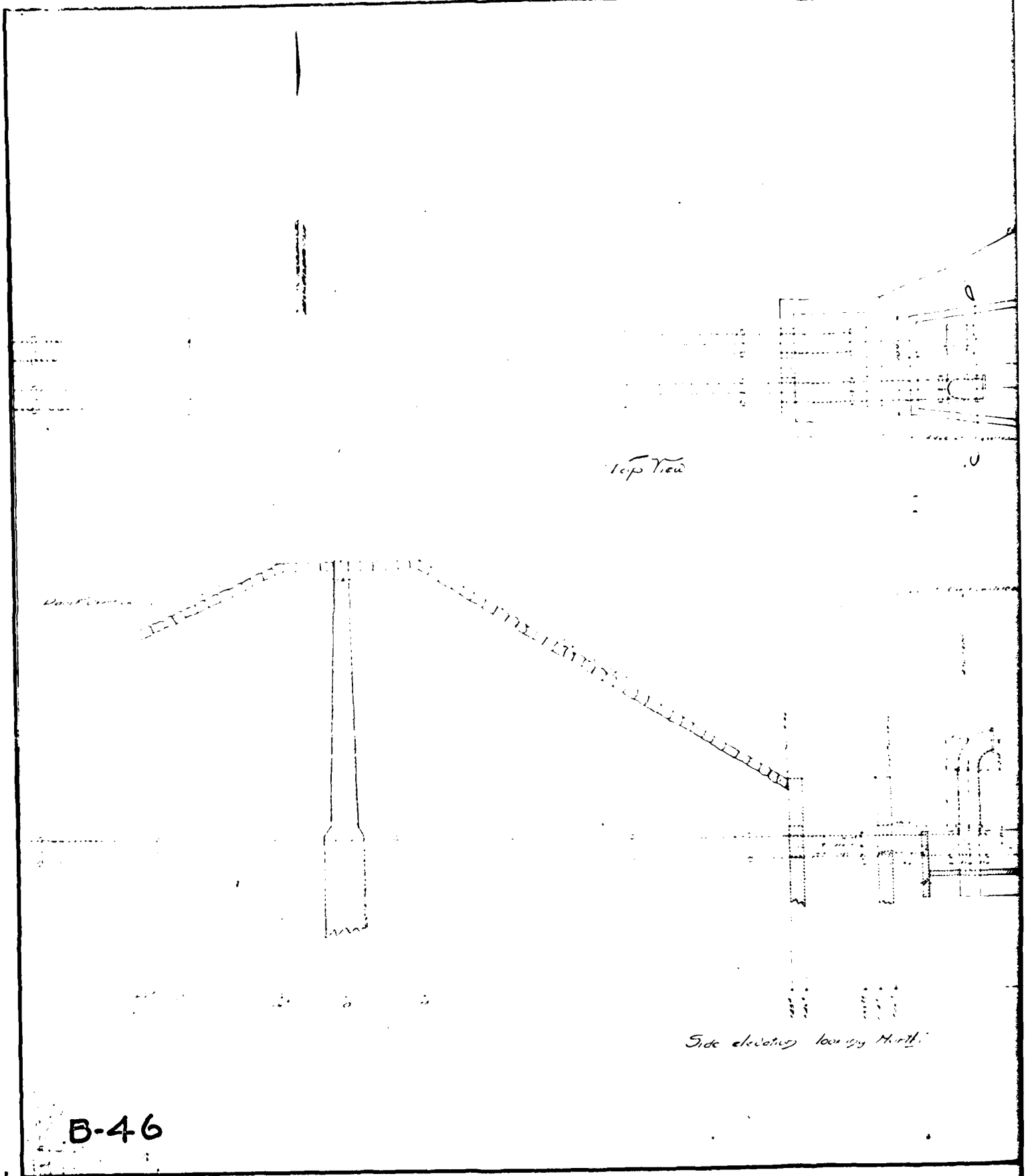
DAM F

HAZELTON CITY AUTHORITY

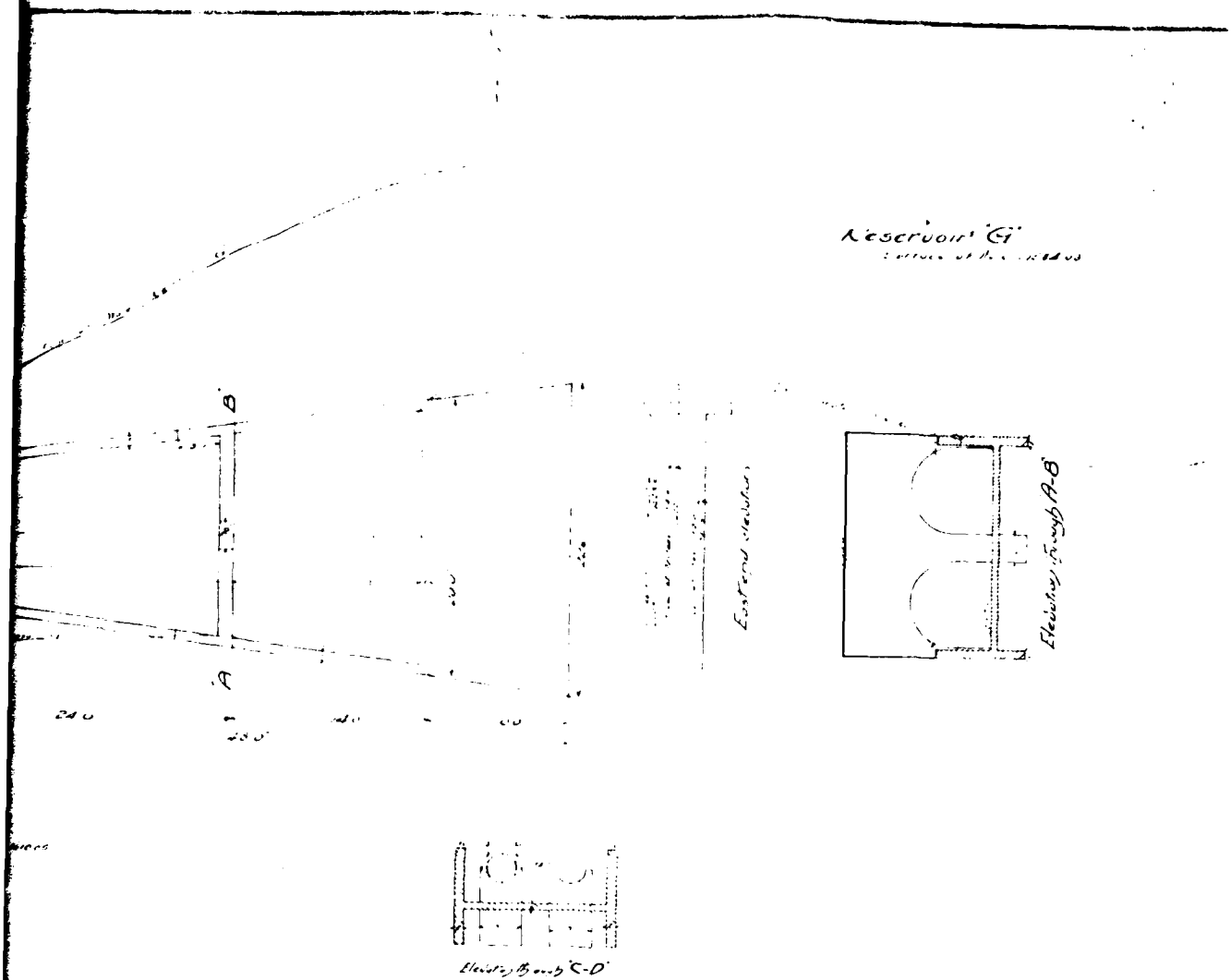
SPILLWAY

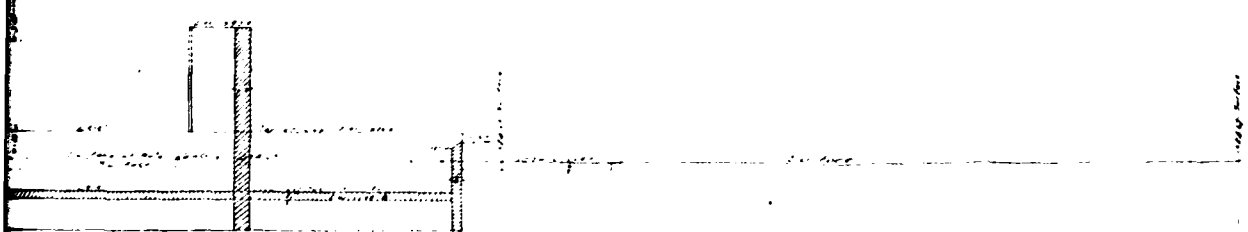
MAY 1979 PLATE 3

3



B-46





Wyoming Valley Water Supply Company
DRECK CREEK RESERVOIR 'F'
SUMP FOR DISCHARGE PIPE
Scale 1-5 ft
Hazleton Pa Aug 18-1915
Approved

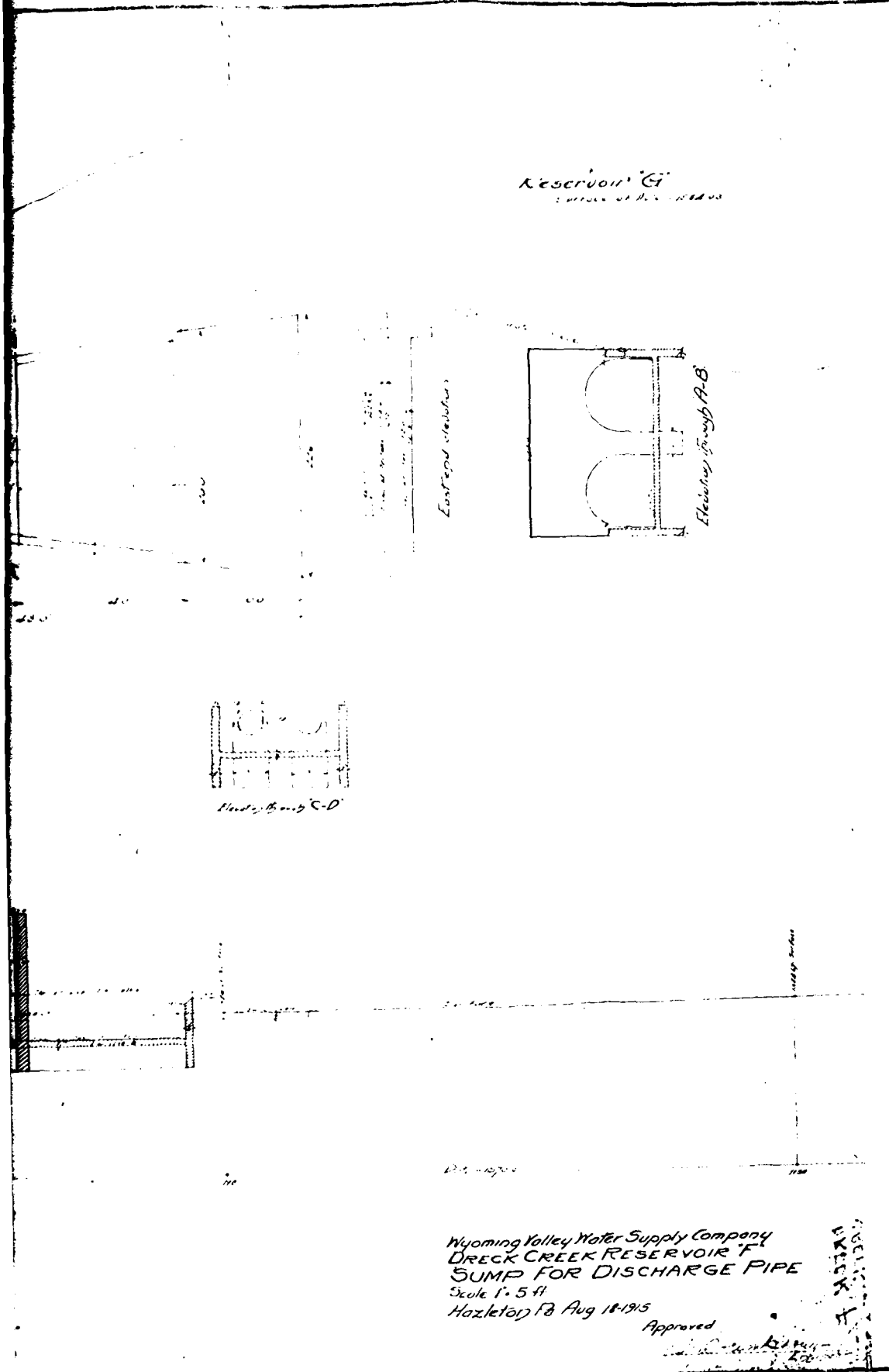
PHASE I INSPE
NATIONAL DAM INSI

DAM

HAZELTON CIT

SECTION
OUTLET WO

MAY 1979



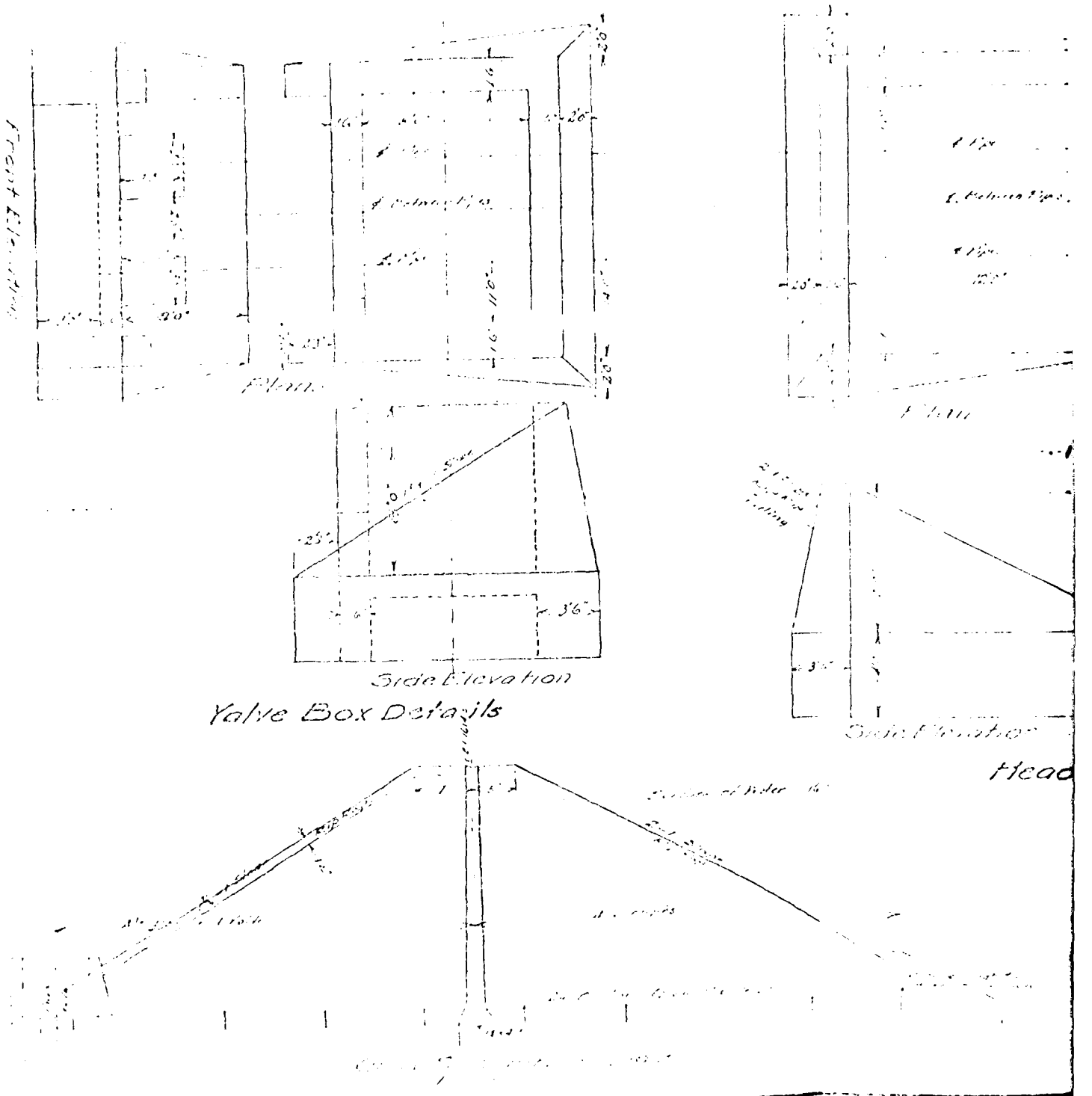
PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

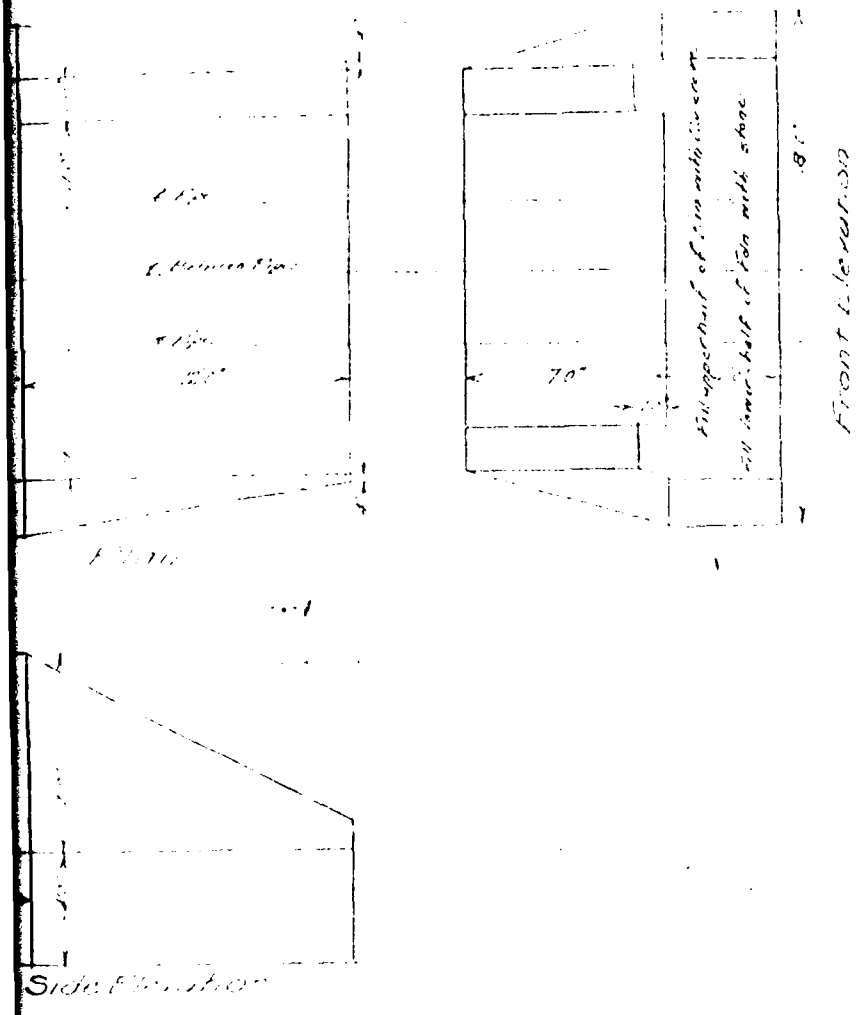
DAM F

HAZELTON CITY AUTHORITY

SECTION AND
OUTLET WORKS PLAN

MAY 1979 PLATE 4


Plan
Side Elevation
Valve Box Details



Head Wall Details

Hazleton Water Co.,
Lessee
DRAINAGE PIPES
HEAD WALL & VALVE BOX DETAILS

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DAM F

HAZELTON CITY AUTHORITY

OUTLET WORKS DETAILS

MAY 1979 PLATE 5

DELAWARE RIVER BASIN

DRECK CREEK, LUZERNE COUNTY

PENNSYLVANIA

DAM F

NDI ID No. PA-00642
DER ID No. 40-13

HAZLETON CITY AUTHORITY

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

MAY 1979

APPENDIX A

CHECKLIST - ENGINEERING DATA

CHECKLIST

ENGINEERING DATA

DESIGN, CONSTRUCTION, AND OPERATION
PHASE I

NAME OF DAM: F
NDS ID NO.: I PA-00642 DER ID NO.: 40-13

Sheet 1 of 4

ITEM	REMARKS
AS-BUILT DRAWINGS	NONE
REGIONAL VICINITY MAP	SEE PLATE 1.
CONSTRUCTION HISTORY	BUILT 1910-1916
TYPICAL SECTIONS OF DAM	SEE PLATE 4
OUTLETS: Plan Details Constraints Discharge Ratings	SEE PLATES 4 AND 5.

A-1

ENGINEERING DATA

ITEM	REMARKS
RAINFALL/RESERVOIR RECORDS	NONE
DESIGN REPORTS	1914 PENNSYLVANIA WATER SUPPLY COMMISSION REPORT
GEOLOGY REPORTS	NONE
DESIGN COMPUTATIONS: Hydrology and Hydraulics Dam Stability Seepage Studies	NONE
MATERIALS INVESTIGATIONS: Boring Records Laboratory Field	NONE
POSTCONSTRUCTION SURVEYS OF DAM	NONE

ENGINEERING DATA

ITEM	REMARKS
BORROW SOURCES	NOT NOTED
MONITORING SYSTEMS	NONE
MODIFICATIONS	NONE
HIGH POOL RECORDS	NONE
POSTCONSTRUCTION ENGINEERING STUDIES AND REPORTS	NONE
PRIOR ACCIDENTS OR FAILURE OF DAM: Description Reports	NONE

ENGINEERING DATA

ITEM	REMARKS
MAINTENANCE AND OPERATION RECORDS	NONE
SPILLWAY: Plan Sections Details	SEE PLATE 3
OPERATING EQUIPMENT: Plans Details	SEE PLATES 4 & 5
PREVIOUS INSPECTIONS Dates Deficiencies	1916 - NO DEFICIENCIES 1920 - TOP OF CORE-WALL DISINTEGRATING. 1923 - PER 1920 AND SMALL SEEPS AT TOE OF SPILLWAY AND AT EACH SIDE OF OUTLET WORKS. FILL ON EACH SIDE OF CORE WALL HAS SETTLED SLIGHTLY. 1924 - BY OWNER. CONSIDERABLE LEAKAGE NEAR SPILLWAY WINGWALL. SPILLWAY SHOWS SIGNS OF DETERIORATION. TOP OF CORE-WALL IS SPALLING. FILL SETTLED SLIGHTLY. 1925 - A FEW TREES ON DOWNSTREAM FACE, SLIGHT SEEPAGE, FILL SETTLED 0" TO 8", SLIGHT DETERIORATION OF SPILLWAY WALLS

A-4

ENGINEERING DATA

ITEM	REMARKS
PREVIOUS INSPECTIONS (CONTINUED)	1928 - UPSTREAM AND DOWNSTREAM PAVING RELAID AND FILL PLACED AT TOP OF EMBANKMENT (WORK IN PROGRESS). SLIGHT SEEPAGE.
	1931 - SLIGHT LEAKAGE, SOME DISINTEGRATION OF CONCRETE IN SPILLWAY. 1934 - SPILLWAY CONCRETE SOMEWHAT DISINTEGRATED; SMALL FLOW AT LOWER END OF SPILLWAY.
	1938 - SOME DISINTEGRATION OF SPILLWAY WALLS, THE SLAB HAS BEEN REPAIRED. SMALL FLOW AT END OF SPILLWAY. TWO SMALL STREAMS AT TOE BETWEEN SPILLWAY AND OUTLET WORKS.
	1944 - RIPRAP ON DOWNSTREAM SLOPE FOR A LENGTH OF 50 FEET IS BADLY HEADED "SHOULD BE REPAIRED". CONSIDERABLE AMOUNT OF LEAKAGE. WALLS AND SLABS OF SPILLWAY ARE
	BADLY DISINTEGRATED AND CRACKED. FLASHBOARDS ON SPILLWAY. REPAIRS ORDERED. 1965 - NO DEFICIENCIES.

DELAWARE RIVER BASIN

DRECK CREEK, LUZERNE COUNTY

PENNSYLVANIA

DAM F

NDI ID No. PA-00642
DER ID No. 40-13

HAZLETON CITY AUTHORITY

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

MAY 1979

APPENDIX B

CHECKLIST - VISUAL INSPECTION

CHECKLIST

VISUAL INSPECTION

PHASE I

Name of Dam: F County: LUZERNE State: PENNSYLVANIA

NDI ID No.: PA-00642 DER ID No.: 40-13

Type of Dam: EARTHFILL W/ CORE-WALL Hazard Category: HIGH

Date(s) Inspection: 11 APRIL 1979 Weather: CLEAR Temperature: 45°F

SOIL CONDITIONS: VERY MOIST

Pool Elevation at Time of Inspection: 1610.5 msl/Tailwater at Time of Inspection: 1584.0 msl

Inspection Personnel:

D. WOLF (GFCC)

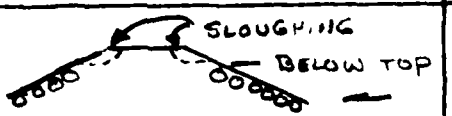
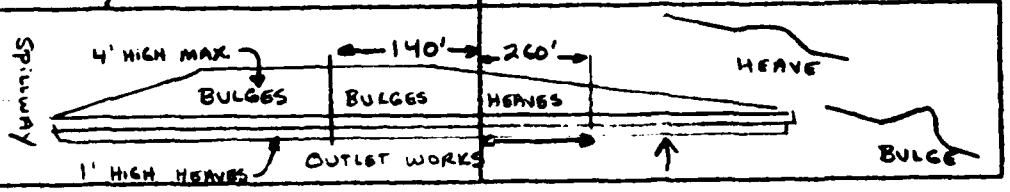
D. EBERSOLE (GFCC)

A. WHITMAN (GFCC) Recorder

B-1

EMBANKMENT

Sheet 1 of 2

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	NONE	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	NONE	
SLOUGHING OR EROSION: Embankment Slopes Abutment Slopes		MINOR FOR RIPRAP - SEE SURVEY DATA.
CREST ALIGNMENT: Vertical Horizontal	HORIZONTAL - NO DEFICIENCIES VERTICAL - SEE SURVEY DATA FOLLOWING INSPECTION FORMS.	
RIPRAP FAILURES		

B-2

EMBANKMENT

Sheet 2 of 2

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT WITH: Abutment Spillway Other Features	NO DEFICIENCIES	
ANY NOTICEABLE SEEPAGE	SEE PLATE B-1	
STAFF GAGE AND RECORDER	NONE	
DRAINS	NONE	
BRUSH	BRUSH ON SLOPES TREES AT TOE	

B-3

OUTLET WORKS

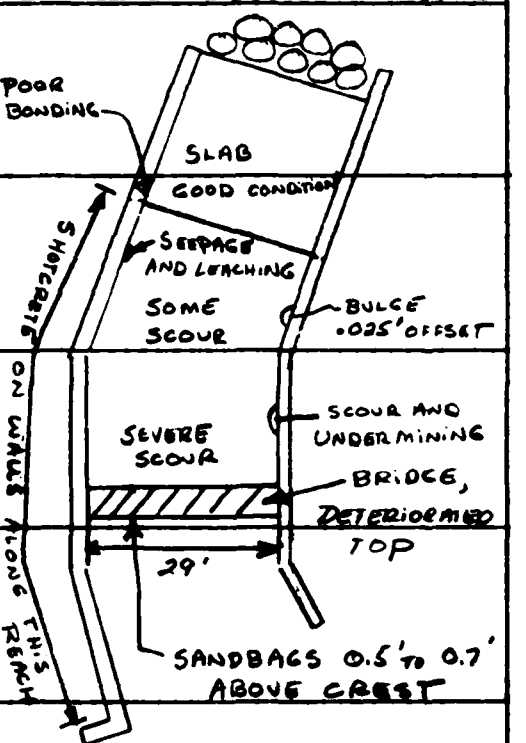
Sheet 1 of 1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	CAST-IRON PIPE	LEFT LINE REDUCES TO 6-INCH DIAMETER AND SPRAYER.
INTAKE STRUCTURE	SUBMERGED	
OUTLET STRUCTURE VALVE HOUSE	ROOF NEAR COLLAPSE. CONCRETE VERY DETERIORATED	NO READY ACCESS TO RIGHT LINE VALVE
OUTLET CHANNEL	NONE.	
EMERGENCY GATE	OWNER DECLINED TO OPERATE, CONCERNED THAT VALVES WOULD REMAIN OPEN.	

UNGATED SPILLWAY

Sheet 1 of 1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	SANDBAGS ALONG CREST	
APPROACH CHANNEL	CONCRETE PAVED CHANNEL	
DISCHARGE CHANNEL	SEE SKETCH	
BRIDGE AND PIERS	LOW STEEL AT DESIGN TOP OF DAM ELEVATION. SEE SKETCH	
SKETCH NOTES	1. NO CONTRACTION JOINTS ALONG SHOTCRETE	NOTE: SHRINKAGE CRACKS ON LEFT WALL. PATTERN CRACKS AND LEACHING ON RIGHT WALL.



B-5

INSTRUMENTATION

Sheet 1 of 1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	NONE	
OBSERVATION WELLS	NONE	
WEIRS	NONE	
PIEZOMETERS	NONE	
OTHER	NONE	

RESERVOIR AND WATERSHED

Sheet 1 of 1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	FAIRLY STEEP.	
SEDIMENTATION	NO REPORTED OR OBSERVED PROBLEMS.	
WATERSHED DESCRIPTION	MOSTLY WOODED. STRIP MINING AT FRINGE (MINOR IN EXTENT) MINOR DEVELOPMENT ALONG	PUBLIC ROAD.

B-7

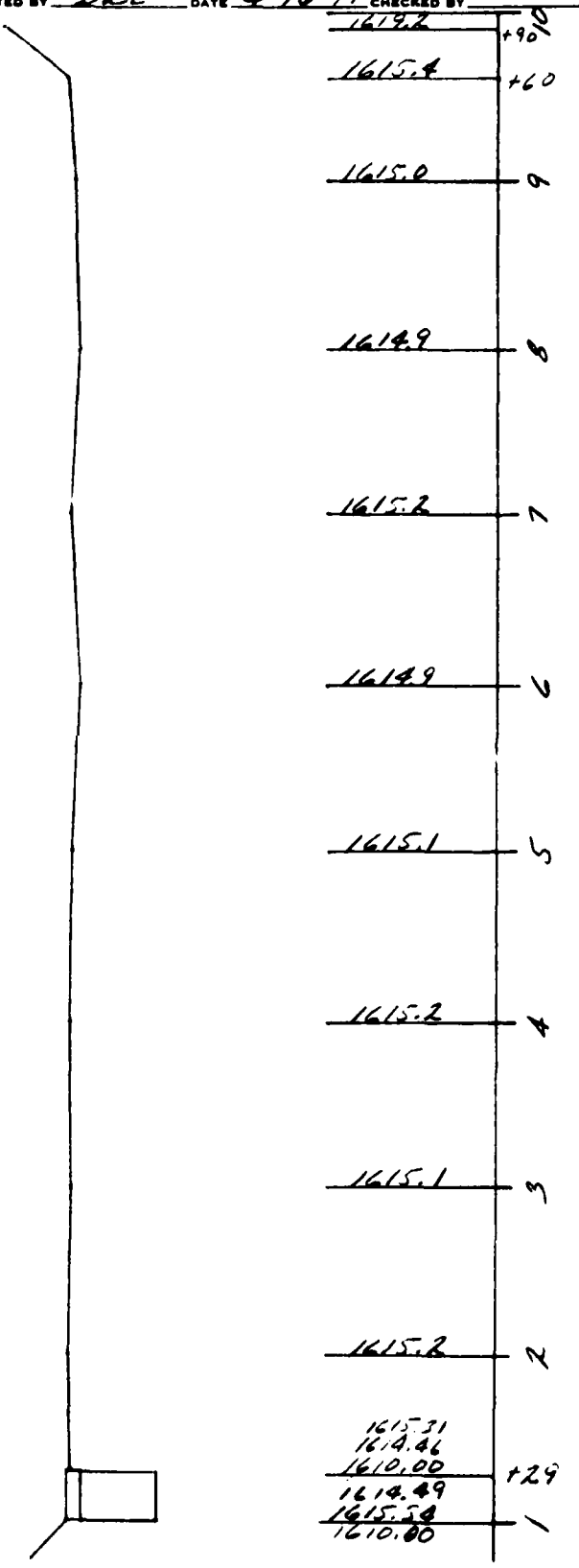
DOWNSTREAM CHANNEL

Sheet 1 of 1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION: Obstructions Debris Other	DAM G RESERVOIR.	
SLOPES	N/A	
APPROXIMATE NUMBER OF HOMES AND POPULATION	WEATHERLY - OVER 40 DWELLINGS IN FLOODPLAIN.	

GANNETT FLEMING CORDDRY AND CARPENTER, INC.
HARRISBURG, PA

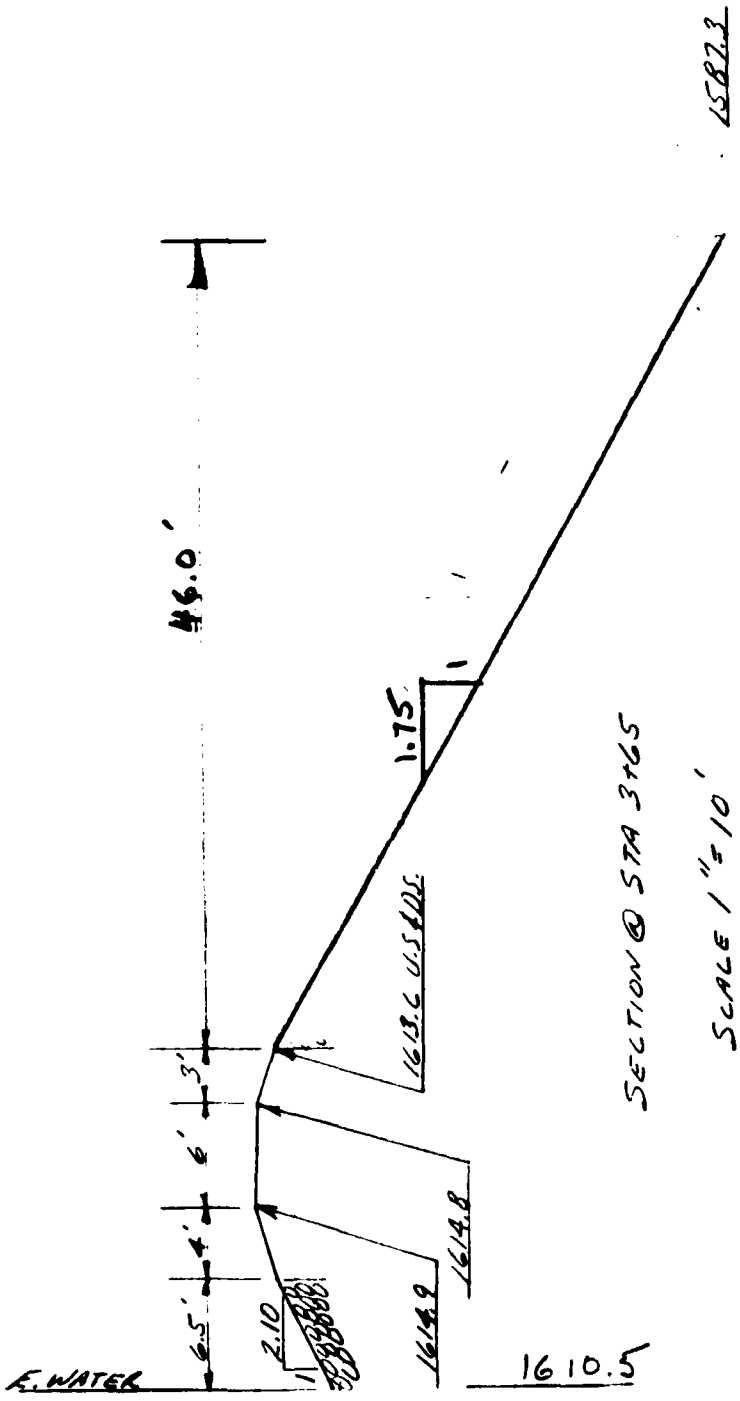
SUBJECT DAM F — FILE NO. 7832
PROFILE - TOP of DAM — SHEET NO. 1 OF ___ SHEETS
FOR USGS - DWAL INSPECTIONS
COMPUTED BY DKL DATE 4-16-79 CHECKED BY ___ DATE ___



B-9

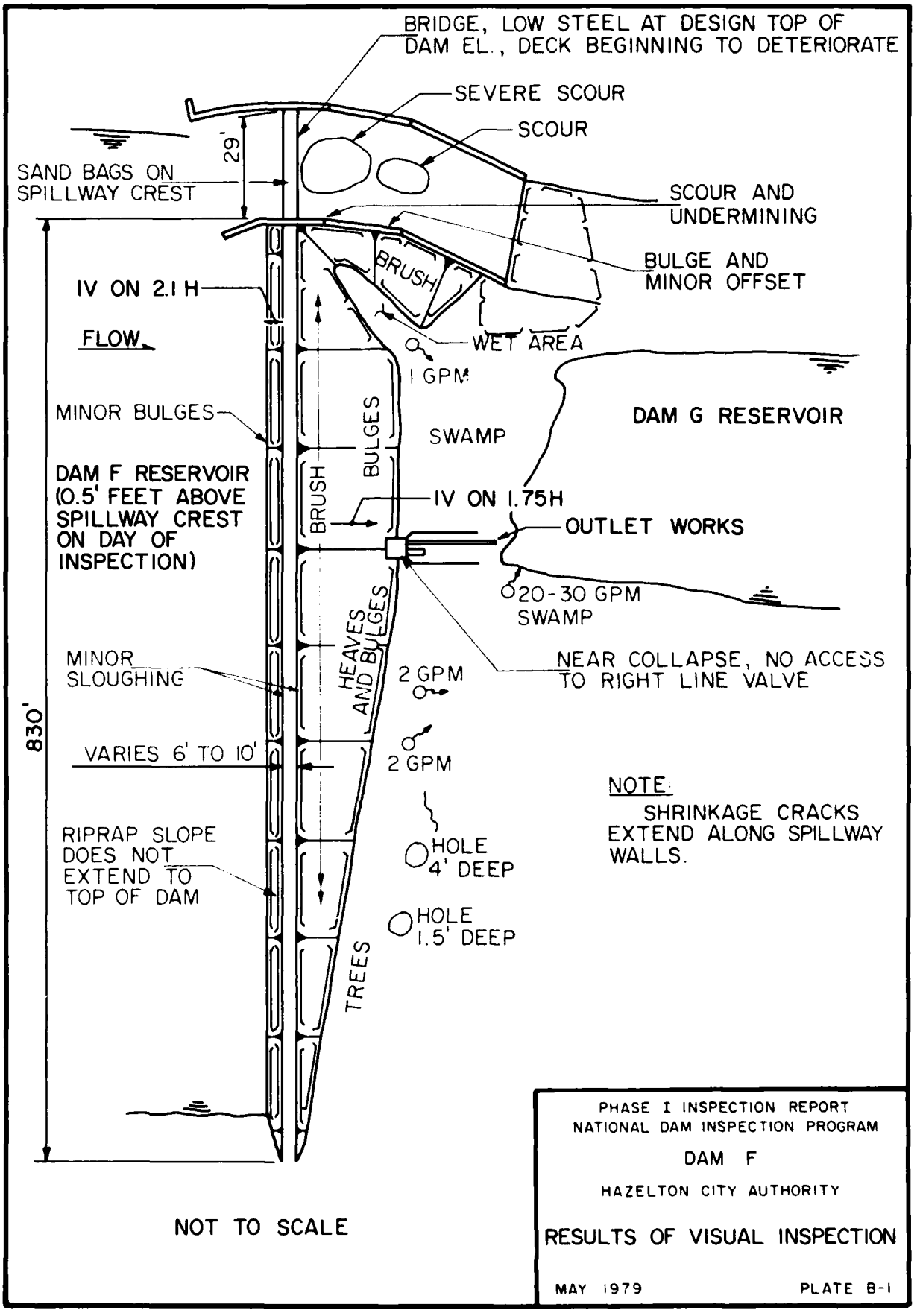
GANNETT FLEMING CORDDRY AND CARPENTER, INC.
HARRISBURG, PA.

SUBJECT DAM E — FILE NO. 7832
EMBANKMENT SECTION — SHEET NO. 1 OF ____ SHEETS
FOR USCE - DAM INSPECTIONS
COMPUTED BY DRE DATE 4-16-79 CHECKED BY ____ DATE ____



B-10

0513



PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DAM F

HAZELTON CITY AUTHORITY

RESULTS OF VISUAL INSPECTION

MAY 1979 PLATE B-1

DELAWARE RIVER BASIN

DRECK CREEK, LUZERNE COUNTY

PENNSYLVANIA

DAM F

NDI ID No. PA-00642
DER ID No. 40-13

HAZLETON CITY AUTHORITY

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

MAY 1979

APPENDIX C

HYDROLOGY AND HYDRAULICS

APPENDIX C

HYDROLOGY AND HYDRAULICS

In the recommended Guidelines for Safety Inspection of Dams, the Department of the Army, Office of the Chief of Engineers (OCE), established criteria for rating the capacity of spillways. The recommended Spillway Design Flood (SDF) for the size (small, intermediate, or large) and hazard potential (low, significant, or high) classification of a dam is selected in accordance with the criteria. The SDF for those dams in the high hazard category varies between one-half of the Probable Maximum Flood (PMF) and the PMF. If the dam and spillway are not capable of passing the SDF without overtopping failure, the spillway capacity is rated as inadequate. If the dam and spillway are capable of passing one-half of the PMF without overtopping failure, or if the dam is not in the high hazard category, the spillway capacity is not rated as seriously inadequate. A spillway capacity is rated as seriously inadequate if all of the following conditions exist:

(a) There is a high hazard to loss of life from large flows downstream of the dam.

(b) Dam failure resulting from overtopping would significantly increase the hazard to loss of life downstream from the dam from that which would exist just before overtopping failure.

(c) The dam and spillway are not capable of passing one-half of the PMF without overtopping failure.

APPENDIX C

DELAWARE River Basin

Name of Stream: DRECK CREEK

Name of Dam: F

NDI ID No.: PA-00642

DER ID No.: 40-13

Latitude: N 40° 56' 55" Longitude: W 75° 54' 35"

Top of Dam ~~(low spot)~~ Elevation: 1614.5

Streambed Elevation: 1583.6 Height of Dam: 31 ft

Reservoir Storage at Top of Dam Elevation: 885 acre-ft

Size Category: SMALL

Hazard Category: HIGH (see Section 5)

Spillway Design Flood: VARIES PMF TO 1/2 PMF

BECAUSE DAM G downstream HAS SDF = PMF
USE PMF

UPSTREAM DAMS

Name	Distance from Dam (miles)	Height (ft)	Storage at top of Dam Elevation (acre-ft)	Remarks
DAM "K"	(BREACHED AND SUBMERGED IN			
	DAM F RESERVOIR)			

DOWNSTREAM DAMS

DAM "G"	0.3	19	179	PA-00643 DER 40-14

DELAWARE River Basin

Name of Stream: DRECK CREEK

Name of Dam: F

~~NDC ID No.~~: _____

~~PennDOT ID No.~~: _____

Latitude: N 40° 56' 55" Longitude: W 75° 54' 35"

DETERMINATION OF PMF RAINFALL

For Area A

which consists of Subareas A1 of 2.43 sq. mile

Total Drainage Area 2.43 sq. mile

PMF Rainfall Index = 22.5 in., 24 hr., 200 sq. mile

	Hydromet. 40 (Susquehanna Basin)	Hydromet. 33 (Other Basins)
Zone	N/A	6
Geographic Adjustment Factor	N/A	1.0
Revised Index Rainfall	N/A	22.5

RAINFALL DISTRIBUTION (percent)

Time	Percent
6 hours	113
12 hours	124
24 hours	132
48 hours	143
72 hours	N/A
96 hours	N/A

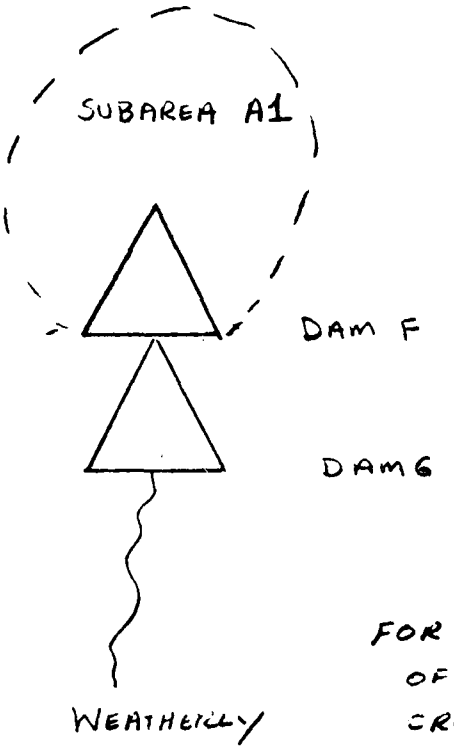
GANNETT FLEMING CORDDRY
AND CARPENTER, INC.
HARRISBURG, PA.

SUBJECT _____ FILE NO. _____

_____ SHEET NO. ____ OF ____ SHEETS

FOR _____

COMPUTED BY _____ DATE _____ CHECKED BY _____ DATE _____



FOR LOCATION
OF DOWNSTREAM
CROSS SECTIONS
SEE PLATE C-1

SKETCH
OF
SYSTEM

6219

Data for Dam at Outlet of Subarea A1
(see Sketch on Sheet C-__)

Name of Dam: F Sheet 1 of __

Height: 30 FT (~~existing~~)

Spillway Data:	Existing Conditions	Design Conditions
Top of Dam Elevation	1614.9	1614.5
Spillway Crest Elevation	1610.0	1610.0
Spillway Head Available (ft)	4.9	4.5
Type Spillway	CONCRETE CHUTE WITH CONTROL SECTION	
"C" Value - Spillway	3.0	3.0
Crest Length - Spillway (ft)	29.0	30.0
Spillway Peak Discharge (cfs)	944	860
Auxiliary Spillway Crest Elevation	NONE	NONE
Auxiliary Spillway Head Available (ft)	—	—
Type Auxiliary Spillway	—	
"C" Value - Auxiliary Spillway	—	—
Crest Length - Auxiliary Spillway (ft)	—	—
Auxiliary Spillway Peak Discharge (cfs)	—	—
Combined Spillway Discharge (cfs)	≈ 940*	860
Spillway Rating Curve:	USE DESIGN HEAD	SEE NEXT SHEET

Elevation	Q Spillway (cfs)	Q Auxiliary Spillway (cfs)	Combined (cfs)

*830 CFS AT DESIGN HEAD

GANNETT FLEMING CORDDRY AND CARPENTER, INC.
HARRISBURG, PA.

SUBJECT _____ FILE NO. _____
SHEET NO. ____ OF ____ SHEETS
FOR _____
COMPUTED BY _____ DATE _____ CHECKED BY _____ DATE _____

BRIDGE EFFECTS - DAM F

LOW CHORD AT EL 1614.5

BECAUSE OF DRAWDOWN EFFECT
IF RES. IS DRAWN DOWN, THE
BRIDGE SHOULD NOT HAVE
EFFECT WHEN THE POOL IS
AT LOW CHORD ELEVATION (1614.5)

AFTER THE ELEVATION, THE
CHORD WILL BE SUBMERGED WITH
FLOW.

USE decision ELEVATION TO
RATE Spillway

SAILBOAT ON Spillway
HAVE BEEN REMOVED
IN ANALYSIS.

6313

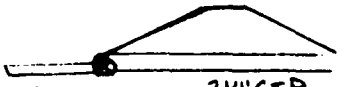
Data for Dam at Outlet of Subarea A1

Name of Dam: "F" Sheet 2 of __

Outlet Works Rating:	Outlet 1	Outlet 2 (COMBINED)	Outlet 3
Invert of Outlet	1593.1	—	1583.6
Invert of Inlet	1584.8	1584.8	
Type	CIP	CIP	CIP
Diameter (ft) = D	2	2	0.5
Length (ft) = L	114	108	43
Area (sq. ft) = A	3.142	3.142	.196
N	.013	.013	.013
K Entrance	0.5	0.5	—
K Exit	1.0	—	1.0
K Friction* = $29.1 n^2 L/R^{4/3}$	1.413	1.338	3.384
Sum of K	2.91	1.838 .115 Σ 4.50	4.384 (1) 4.384 (2)
$(1/K)^{0.5}$ = C	.586	.471	
Maximum Head (ft) = HM	21.4	30.9	
Q = C A $\sqrt{2g(HM)}$ (cfs)	68	4	
Q Combined (cfs)	72		

(1) REFERENCED TO D

(2) REFERENCED TO 6" dia. pipe



OUTLETS 2 & 3

* R = Hydraulic Radius = (Area/Wetted Perimeter) = D/4 for Circular Conduits.

Data for Dam at Outlet of Subarea A1

Name of Dam: F Sheet 3 of ___

Storage Data:

Elevation	Area (acres)	Storage million gals	Storage acre-ft	Remarks
1582.4 = ELEVO*	0	0	0	
1610.0 = ELEV1	64 = A1	192	589 = S1	
1614.5	67.6		885	INTERPOLATED
1614.9	68.0		912	INTERPOLATED
1620 **	72.2			
**				

* ELEVO = ELEV1 - $(3S_1/A_1)$

** Planimetered contour at least 10 feet above top of dam

Reservoir Area at ~~Top of Dam~~ Normal Pool is 4 percent of watershed.

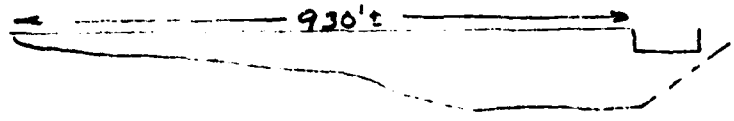
Remarks: ___

Data for Dam at Outlet of Subarea A1

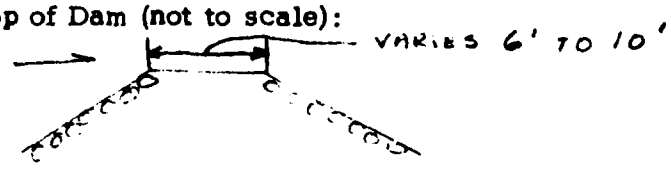
Name of Dam: F Sheet 4 of __

Breach Data:

Sketch of Dam Profile (not to scale):



Sketch of Top of Dam (not to scale):



Soil Type from Visual Inspection: SANDY SILT

Maximum Permissible Velocity (Plate 28, EM 1110-2-1601) 1.8 fps
(from $Q = CLH^{3/2} = V \cdot A$ and depth = (2/3) x H)

HMAX = $(4/9\ V^2/C^2)$ = .149 ft., C = 3.1

1614.5
HMAX + Top of Dam Elev. = 1614.6 = FAILEL
(Above is elevation at which failure would start)

Dam Breach Data:

BRWID = 85 ft (width of bottom of breach)

Z = 2 (side slopes of breach)

ELBM = 1584.0 (bottom of breach elevation, minimum of zero storage elevation)

WSEL = 1610.0 (normal pool elevation)

T FAIL = 12 mins

= 0.2 hrs (time for breach to develop)

DELAWARE River Basin

Name of Stream: DRECK CREEK

Name of Dam: F

~~NDS ID No.~~: _____

~~DER ID No.~~: _____

Latitude: N 40° 56' 55" Longitude: W 75° 54' 35"

Drainage Area: 2.43 sq. mile

Data for Subarea: A1 (see Sketch on Sheet C-4)

Name of Dam at Outlet of Subarea: F

Drainage Area of Subarea: 2.43 sq. mile

Subarea Characteristics:

Assumed Losses: 1.0-inch initial abstraction + 0.05 in/hr

The following are measured from outlet of subarea to the point noted:

L = Length of Main Watercourse extended to the divide = 2.42 miles

L_{CA} = Length of Main Watercourse to the centroid = 1.14 miles

From NAB Data: AREA 2, PLATE B

Cp = 0.45

C_T = 2.10

$Tp = C_T \times (L \times L_{CA})^{0.3}$ = 2.847 (hrs)

Flow at Start of Storm = 1.5 cfs/sq. mile x Subarea D.A = 3.65 cfs

Computer Data:

QRCSN = -0.05 (5% of peak flow)

RTIOR = 2.0

Remarks: _____

Data for Dam at Outlet of Subarea B
(see Sketch on Sheet C-4)

Name of Dam: G Sheet 1 of __

Height: 19 FT (~~existing~~)

Spillway Data: FROM PHASE I REPORT	Existing Conditions	Design Conditions
Top of Dam Elevation	1586.4	1587.0
Spillway Crest Elevation	1584.0	1584.0
Spillway Head Available (ft)	2.4	3.0
Type Spillway	CONCRETE CHUTE WITH CONTROL SECTION	
"C" Value - Spillway	3.0	3.0
Crest Length - Spillway (ft)	71.8*	75
Spillway Peak Discharge (cfs)	801	1169
Auxiliary Spillway Crest Elevation	NONE	NONE
Auxiliary Spillway Head Available (ft)	—	(SEE TEXT)
Type Auxiliary Spillway	—	
"C" Value - Auxiliary Spillway	—	—
Crest Length - Auxiliary Spillway (ft)	—	—
Auxiliary Spillway Peak Discharge (cfs)	—	—
Combined Spillway Discharge (cfs)	≈800	≈1170

Spillway Rating Curve: * a - 1.5' piers - FROM PHASE I REPORT

Elevation	Q Spillway (cfs)	Q Auxiliary Spillway (cfs)	Combined (cfs)
	N/A		

Data for Dam at Outlet of Subarea B

Name of Dam: G Sheet 3 of ___

Storage Data: FROM PHASE I REPORT

Elevation	Area (acres)	Storage million gals	Storage acre-ft	Remarks
1552.1 = ELEVO*	0	0	0	
1584.0 = ELEV1	13 = A1	45	138 = S1	
1586.4	13.8		170	INTERPOLATED
1587.0	14.0		179	INTERPOLATED
1600.0 **	19			

* ELEVO = ELEV1 - $(3S_1/A_1)$

** Planimetered contour at least 10 feet above top of dam

Reservoir Area at Top of Dam is N/A percent of watershed.

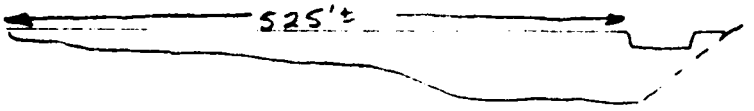
Remarks: ___

Data for Dam at Outlet of Subarea B

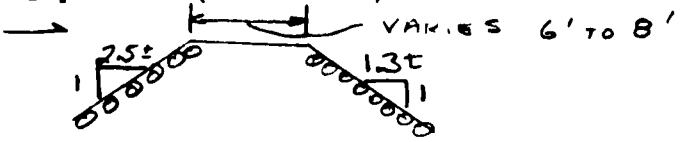
Name of Dam: G Sheet 4 of __

Breach Data:

Sketch of Dam Profile (not to scale):



Sketch of Top of Dam (not to scale):



Soil Type from Visual Inspection: SANDY SILT

Maximum Permissible Velocity (Plate 28, EM 1110-2-1601) 1.8 fps
(from $Q = CLH^{3/2} = V \cdot A$ and depth = (2/3) x H) $A = L \cdot d$

HMAX = $(4/9\ V^2/C^2)$ = .149 ft., C = 3.1

0.1 + 1586.4 Top of Dam Elev. = 1586.5 = FAILEL

(Above is elevation at which failure would start)

Dam Breach Data:

BRWID = 80 ft (width of bottom of breach)

Z = 2 (side slopes of breach)

ELBM = 1568.0 (bottom of breach elevation, minimum of zero storage elevation)

WSEL = 1584.0 (normal pool elevation)

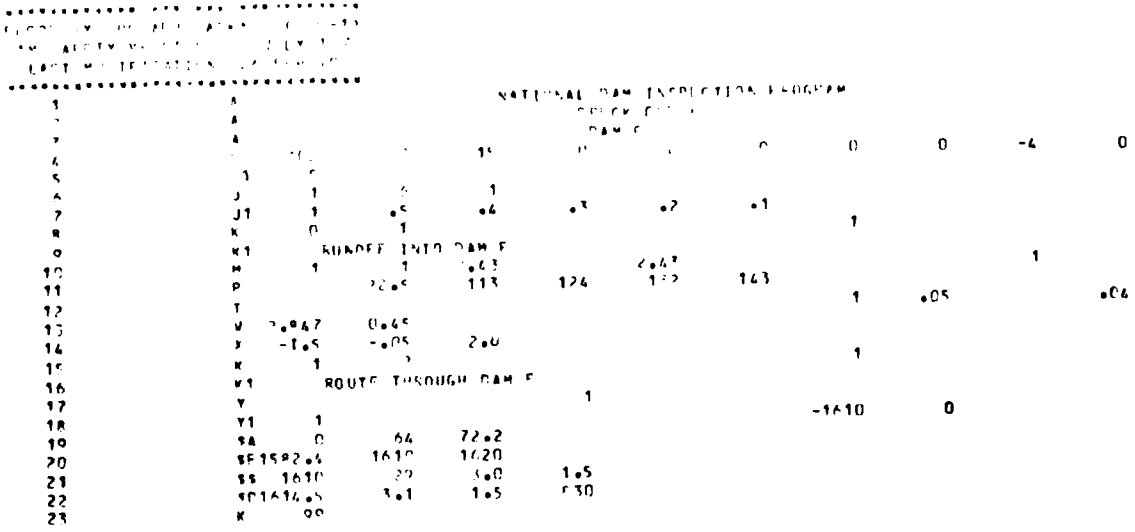
T FAIL = 6 mins

= 0.1 hrs (time for breach to develop)

GANNETT FLEMING CORDDRY
AND CARPENTER, INC.
HARRISBURG, PA.

SUBJECT _____ FILE NO. _____
SHEET NO. ____ OF ____ SHEETS
FOR _____
COMPUTED BY _____ DATE _____ CHECKED BY _____ DATE _____

SELECTED COMPUTER OUTPUT


NATIONAL DAM INSPECTION PROGRAM
SUNDEE INTO DAM F
ROUTE THROUGH DAM F

C-15

PEAK FLOW AND STORAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOW IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIO 1	RATIO 2	RATIO 3	RATIO 4	RATIO 5	RATIO 6
				RATIOS APPLIED TO FLOWS					
				1.00	.50	.40	.30	.20	.10
HYDROGRAPH AT	1	2.67	1	4088.	2334.	1627.	1220.	814.	407.
	(	6.92)	(	115.76)(	66.09)(	46.08)(	34.56)(	23.04)(	11.52)(
ROUTED TO	2	2.67	1	4052.	1965.	1501.	852.	525.	234.
	(	6.92)	(	114.74)(	55.66)(	42.51)(	24.13)(	14.86)(	6.62)(

C-16

SUMMARY OF DAM SAFETY ANALYSIS

DAM F

PLAN 1 ***********

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	[illegible]	[illegible]	1614.5
STORAGE	[illegible]	[illegible]	995.
OUTFLOW	0.	0.	830.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1615.58	1.08	959.	4052.	11.50	42.75	0.00
.50	1615.07	.57	921.	1995.	6.75	43.00	0.00
.40	1614.87	.37	910.	1571.	4.75	43.75	0.00
.30	1614.63	.13	897.	952.	1.25	45.25	0.00
.25	1614.53	0.00	891.	538.	0.00	45.50	0.00
.20	1614.23	0.00	714.	274.	0.00	46.25	0.00

C-17

```
 ********************************
 HYDROGRAPH PACKAGE (HEC-1)
 ** SAFETY VERSION      JULY 1978
 LAST MODIFICATION  26 FEB 79
 ********************************
```

```
A                                NATIONAL DAM INSPECTION PROGRAM
A                                      DRECK CREEK
A                                        DAM F
R     300        0        6        0        0        0        0        0       -4        0
B1      5
J       2        1        1
J1    0.5
K       0                 1                                           1
K1        RUNOFF INTO DAM F
M       1                 1    2.43                2.43                                  1
P                      22.5      113      124      132
T                                                                      1      .05              .04
M   2.4E-7    0.45
X    -1.5     -.05      2.0
K       1                 2                                           1
K1        ROUTE THROUGH DAM F
Y                                                1        1
Y1      1                                                        -1610        0
SA      0        64     72.2
SE1582.4      1610     1620
SS   1610        29      3.0      1.5
SD1614.5       3.1      1.5      R30
SR     85         2     1584      0.2     1610     1620
SB     85         2     1584      0.2     1610   1614.6
K       1         2                                                 1
K1        ROUTE THROUGH DAM G
Y                                                1        1
Y1      1                                                        -1584        0
SA      0        13       19
SE1552.1      1534     1600
SS   1584      71.8      3.0      1.5
SD1586.6
SL      1        20       75      495      560
SV1586.6    1586.6   1596.8   1586.9   1591.7
SB     80         2     1568      0.1     1584     1590
SB     80         2     1548      0.1     1584   1586.5
K       1         3                                                 1
K1        DOWNSTREAM DAM G
Y                                                1        1                                  1
Y1      1                                                          -1
Y6    .09       .07      .09     1540     1600     3400    .0206
Y7      0      1700      750     1600      800     1560      890     1540      940     1540
Y7   1300      1560     1460     1580     1700     1600
K       1         4                                                 1
K1        END DRECK CREEK
Y                                                1        1
Y1      1                                                          -1
Y6    .09       .07      .09     1480     1520     3000    .0183
Y7      0      1550      550     1540      950     1500      110     1480     1200     1480
Y7   1450      1500     1800     1540     2200     1580
```

```
K       1       5                                                       1
K1      HAZLE CREEK-STEEP REACH
Y                                       1       1
Y1      1                                                               -1
Y6      .09     .07     .09     1440    1480    5200    .0183
Y7      0       1560    400     1520    700     1480    900     1440    1200    1440
Y7      1520    1460    1750    1500    2200    1600
K       1       6                                                       1
K1      HAZLE CREEK-FLAT REACH
Y                                       1       1
Y1      1                                                               -1
Y6      .09     .07     .09     1340    1380    6800    .00588
Y7      0       1400    3600    1380    4900    1360    5250    1340    5680    1340
Y7      5950    1360    6420    1380    7080    1400
K       1       7                                                       1
K1      HAZLE CREEK-NARROW APPROACH TO WEATHERLY
Y                                       1       1
Y1      1                                                               -1
Y6      .09     .07     .09     1220    1280    6200    .029
Y7      320     1300    400     1260    650     1240    600     1220    620     1220
Y7      690     1240    770     1260    780     1300
K       1       8                                                       1
K1      WEATHERLY
Y                                       1       1
Y1      1                                                               -1
Y6      .1      .07     .1      1080    1120    4200    .0238
Y7      0       1160    1100    1100    1400    1086    1401    1080    1436    1080
Y7      1437    1086    1550    1100    2150    1200
K       99
```

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIO 1 .50
				RATIOS APPLIED TO FLOWS
HYDROGRAPH AT	1	2.43	1	2019.
		(6.29)		(57.16)(
			2	2019.
				(57.16)(
ROUTED TO	2	2.43	1	1947.
		(6.29)		(55.13)(
			2	50570.
				(1432.00)(
ROUTED TO	2	2.43	1	1945.
		(6.29)		(55.08)(
			2	53856.
				(1525.02)(
ROUTED TO	3	2.43	1	1941.
		(6.29)		(54.95)(
			2	43497.
				(1231.70)(
ROUTED TO	4	2.43	1	1936.
		(6.29)		(54.83)(
			2	36794.
				(1041.88)(
ROUTED TO	5	2.43	1	1879.
		(6.29)		(53.22)(
			2	28980.
				(820.61)(
ROUTED TO	6	2.43	1	1713.
		(6.29)		(48.51)(
			2	16392.
				(464.16)(
ROUTED TO	7	2.43	1	1707.
		(6.29)		(48.34)(
			2	15049.
				(426.15)(
ROUTED TO	8	2.43	1	1706.
		(6.29)		(48.30)(
			2	13940.
				(394.73)(

SUMMARY OF DAM SAFETY ANALYSES

DAM F

PLAN 1 ••••••••••••••••

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1610.00	1610.00	1614.50
STORAGE	589.	589.	885.
OUTFLOW	0.	0.	830.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.50	1615.02	.52	920.	1947.	5.90	19.10	0.00

PLAN 2 ••••••••••••••••

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1610.00	1610.00	1614.50
STORAGE	589.	589.	885.
OUTFLOW	0.	0.	830.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.50	1614.62	.12	893.	50570.	.15	18.30	18.10

SUMMARY OF DAM SAFETY ANALYSIS

DAM G

PLAN 1 ..... INITIAL VALUE SPILLWAY CREST TOP OF DAM

ELEVATION	1584.00	1584.00	1586.40
STORAGE	138.	138.	170.
OUTFLOW	0.	0.	801.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.50	1587.36	.96	184.	1945.	6.60	19.20	0.00

PLAN 2 ..... INITIAL VALUE SPILLWAY CREST TOP OF DAM

ELEVATION	1584.00	1584.00	1586.40
STORAGE	138.	138.	170.
OUTFLOW	0.	0.	801.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.50	1591.37	4.97	244.	53956.	.30	18.30	18.20

PLAN 1 STATION 3

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.50	1941.	1543.5	19.40

PLAN 2 STATION 3

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.50	43497.	1555.2	18.40

PLAN 1 STATION 4

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.50	1936.	1482.8	19.50

PLAN 2 STATION 4

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.50	36796.	1493.2	18.50

PLAN 1 STATION 5

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.50	1979.	1661.3	20.00

PLAN 2 STATION 5

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.50	28980.	1667.7	18.60

PLAN 1 STATION 6

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.50	1713.	1361.4	21.00

PLAN 2 STATION 6

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.50	16392.	1364.3	18.80

PLAN 1 STATION 7

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.50	1707.	1224.5	21.20

PLAN 2 STATION 7

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.50	15069.	1232.7	18.90

PLAN 1 STATION 8

DAMAGE CENTER

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.50	1706.	1085.4	21.20

PLAN 2 STATION 8

DAMAGE CENTER

MAXIMUM	MAXIMUM	TIME

RATIO	FLOW,CFS	STAGE,FT	HOURS	
.50	13940.	1094.0	19.10	DAMAGE CENTER

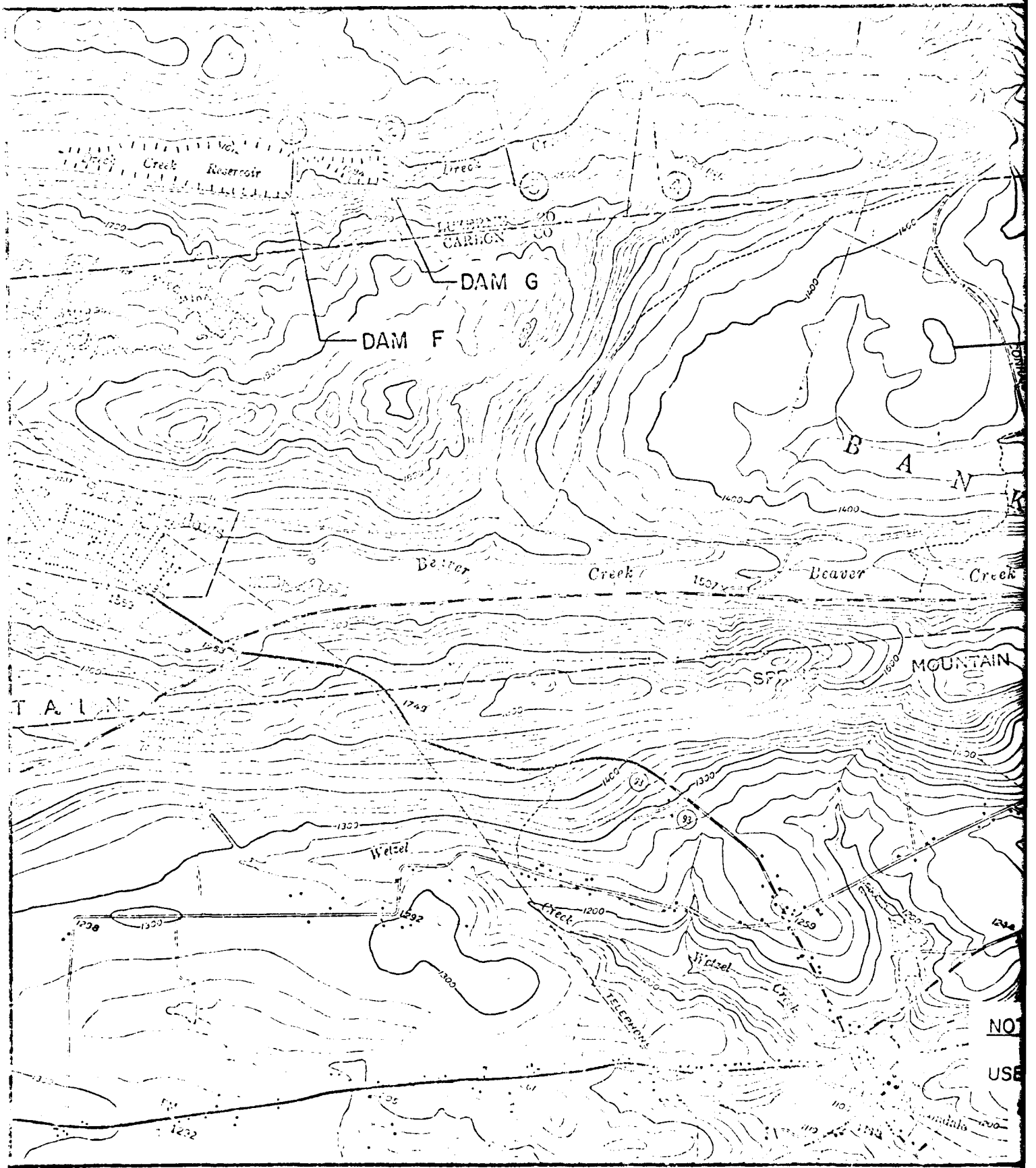
GANNETT FLEMING CORDDRY AND CARPENTER, INC.
HARRISBURG, PA.

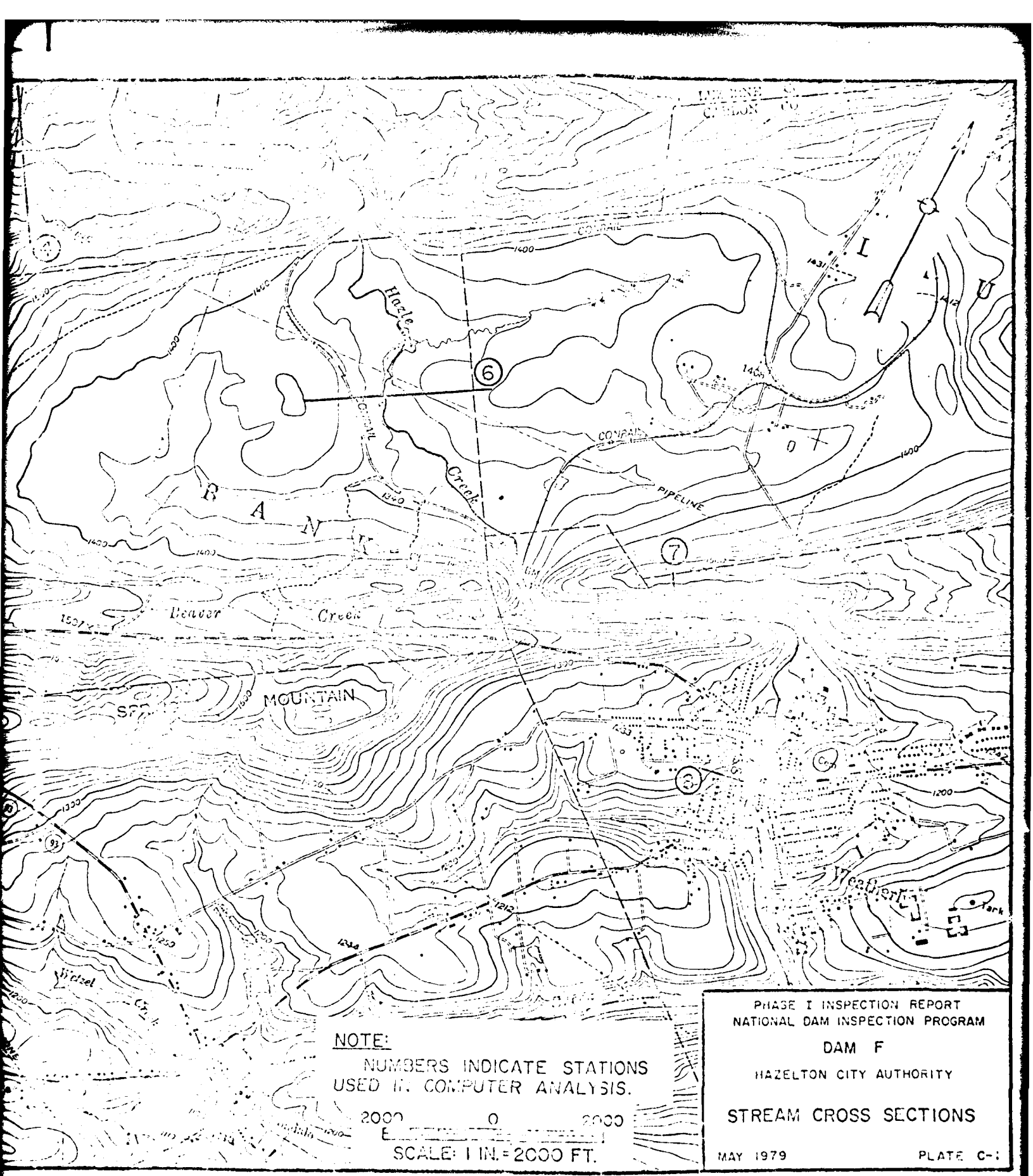
SUBJECT _____ FILE NO. _____
SHEET NO. ____ OF ____ SHEETS
FOR _____
COMPUTED BY _____ DATE _____ CHECKED BY _____ DATE _____

Summary of Pertinent Results

PMF RAINFALL = 25.74"

	PMF	½PMF
Runoff (inches)	23.44	11.72
Inflow to Dam F (cfs)	4068	2034
Outflow from Dam F (cfs)	4,052	1,985
Height of overtopping (ft)	1.08	0.53
Duration of overtopping (ft).	11.50	6.75


DAM G
DAM F
CARBON CO
Beaver Creek
Beaver Creek
MOUNTAIN
Wetzel
Wetzel Creek
TELEPHONE



NOTE:

NUMBERS INDICATE STATIONS USED IN COMPUTER ANALYSIS.

2000 0 2000

SCALE: 1 IN. = 2000 FT.

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DAM F

HAZELTON CITY AUTHORITY

STREAM CROSS SECTIONS

MAY 1979

PLATE C-1

DELAWARE RIVER BASIN

DRECK CREEK, LUZERNE COUNTY

PENNSYLVANIA

DAM F

NDI ID No. PA-00642
DER ID No. 40-13

HAZLETON CITY AUTHORITY

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

MAY 1979

APPENDIX D

PHOTOGRAPHS

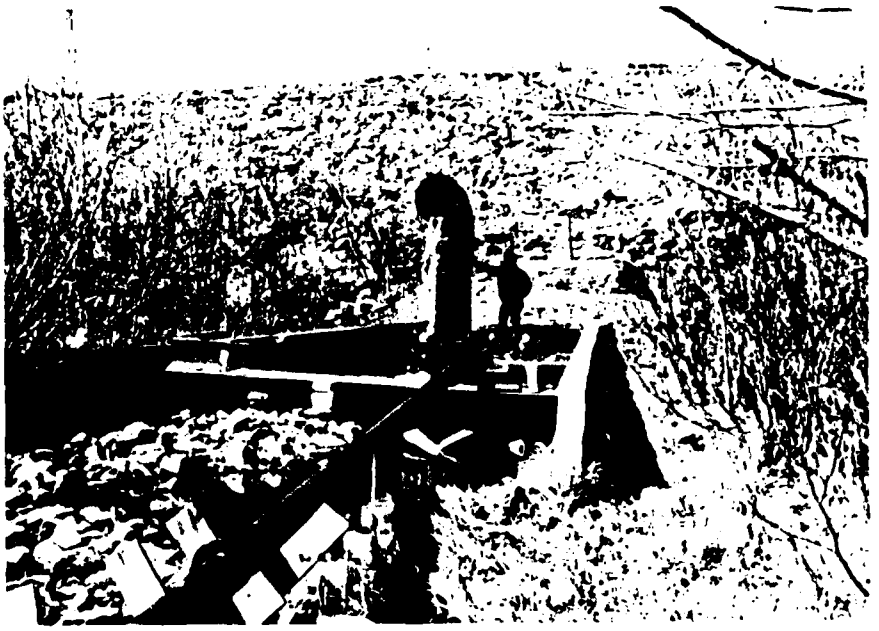
A. Top of Dam and Upstream Slope

B. Downstream Slope

C. Sloughing at Top of Downstream Slope

D. Bulges on Downstream Slope

E. Outlet Works and Downstream Toe



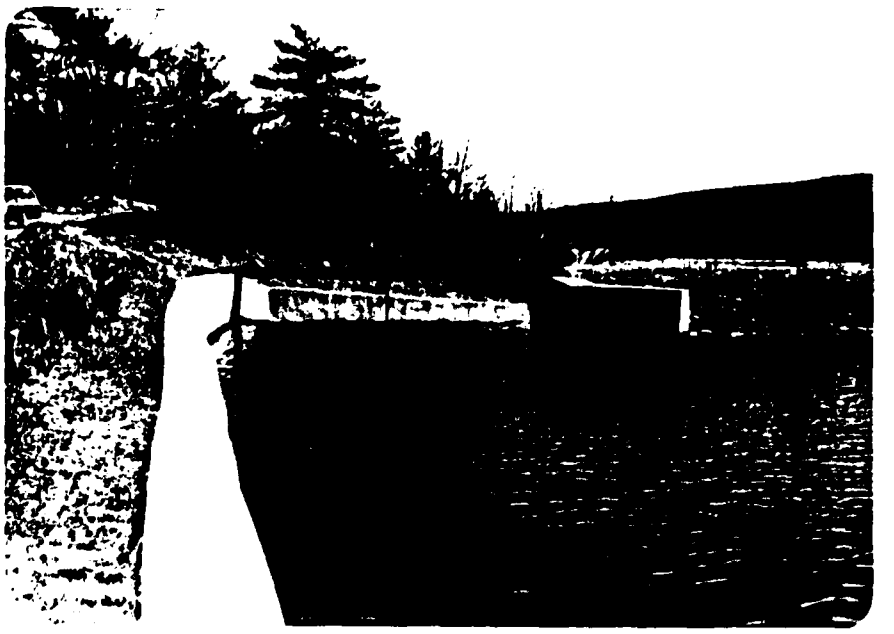
F. Outlet Works

AD-A079 050 GANNETT FLEMING CORDDRY AND CARPENTER INC HARRISBURG PA F/G 13/13
NATIONAL DAM INSPECTION PROGRAM. DAM F (NDI ID NUMBER PA-00642 --ETC(U)
MAY 79 A C HOOKE DACW31-79-C-0015

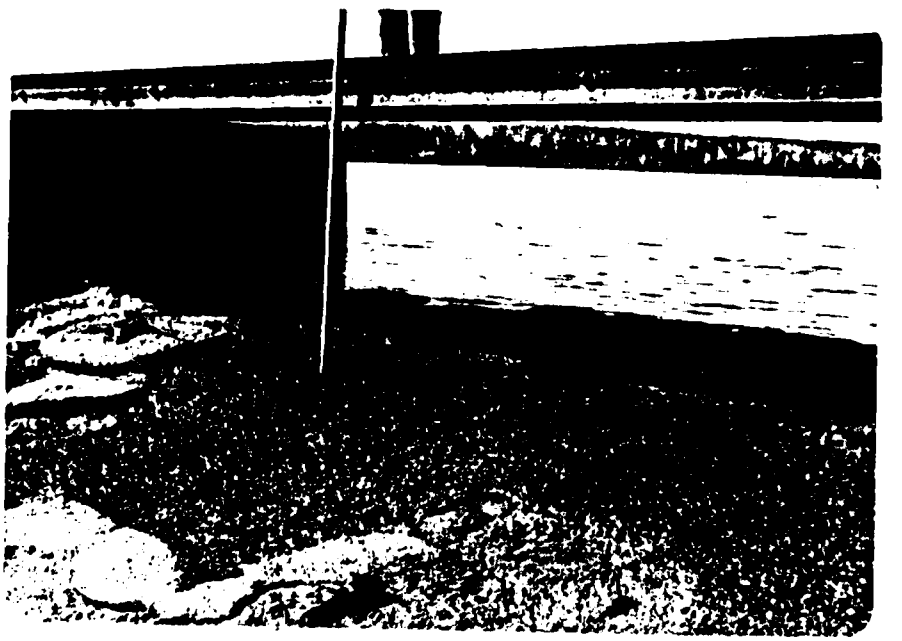
UNCLASSIFIED NL

2 OF 2
AD
A079050

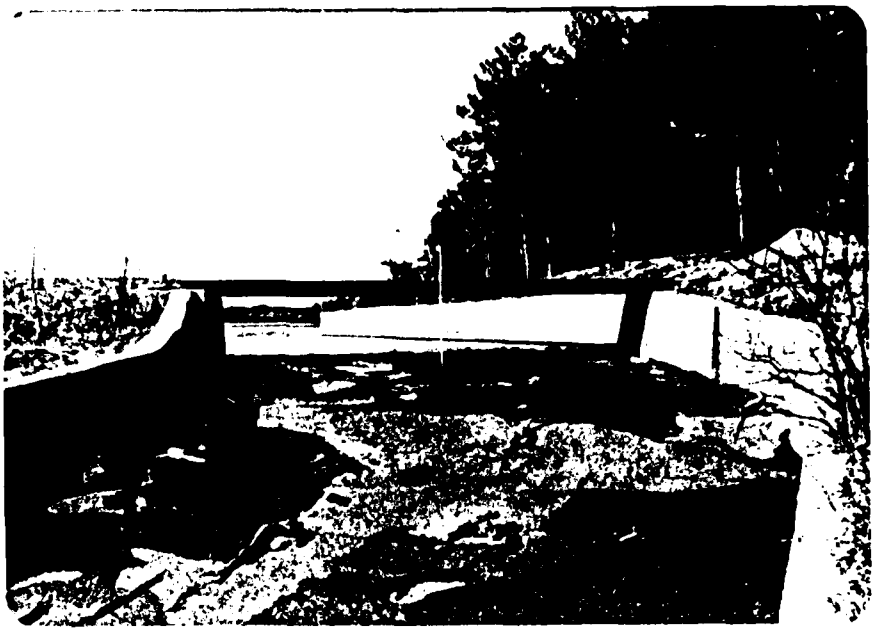
END
DATE FILMED
2 80
DDC



G. Spillway Approach



H. Spillway Crest



I. Spillway Chute

J. Spillway Chute

DELAWARE RIVER BASIN

DRECK CREEK, LUZERNE COUNTY

PENNSYLVANIA

DAM F

NDI ID No. PA-00642
DER ID No. 40-13

HAZLETON CITY AUTHORITY

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

MAY 1979

APPENDIX E

GEOLOGY

DAM F

APPENDIX E

GEOLOGY

1. General Geology. The damsite and reservoir are located in Luzerne County. The rock formations exposed in Luzerne County range from the Post-Pottsville formations, of Pennsylvanian Age, down to the Onondaga formation, of Middle Devonian Age. The Wisconsin terminal moraine crosses the southern part of the County, and the greater part of the County is covered by glacial drift. Extensive deposits of glacial outwash occur along the Susquehanna River and less extensive deposits along the smaller streams.

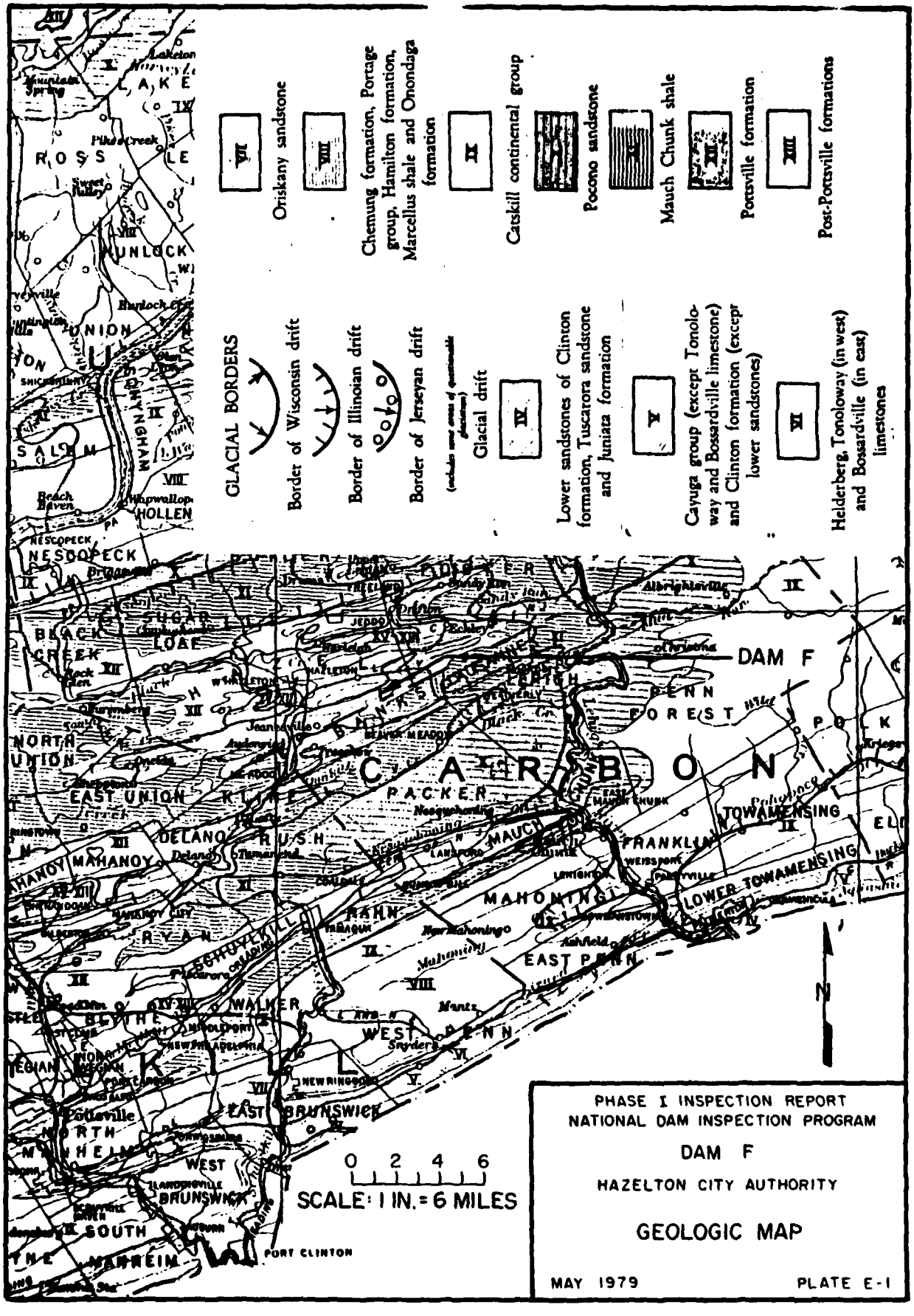
Nearly all of Luzerne County lies in the Valley and Ridge Province in which nearly all the rocks have been strongly folded. In going from north to south across the County, five major folds are encountered, all of which trend northeast. The first of these is a shallow syncline on the crest of North Mountain, forming the Mehoopnay coal basin. The second is the Milton Anticline, which exposes the Portage group in the northwestern part of the County and gradually flattens out toward the northeast. The third and most pronounced is the Lackawanna Syncline, which originates in Lackawanna County to the north, and has preserved the post-Pottsville formations throughout the Wyoming Valley. The maximum depth of this syncline is reached in the vicinity of Wilkes-Barre and Plymouth. The double rim of this syncline is formed by the resistant Pottsville formation and Pocono sandstone, separated by the less resistant Mauch Chunk shale. The fourth fold is the Berwick (Montour) Anticline, which exposes a few feet of the Onondag formation in the vicinity of Beach Haven. This fold reaches its maximum development farther west and only the eastern portion reaches

Luzerne County. The fifth major fold comprises a series of anticlines and synclines forming the Eastern Middle Anthracite Field in the vicinity of Hazleton. The synclinal basins in this region are relatively shallow and there are large areas from which all coal-beds have been eroded.

The general dips of the region vary from 0^{o} to 40^{o}, and the maximum dips are found on the rims and within the synclinal coal basins. The relatively soft Post-Pottsville beds in their cores are severely folded and contorted with numerous minor faults. The northern and easternmost parts of the County border the Appalachian Plateau Province and are characterized by horizontal, or nearly horizontal strata. The Catskill continental group of rocks underlies those parts of Luzerne County that are outside of the five major fields.

2. Site Geology. Dam F is situated on the Pottsville formation of Pennsylvanian Age. The southern shoreline of the Reservoir delineates the contact between the Pottsville and Llewellyn formations. The Llewellyn formations contain the mineable anthracite coals. The Pottsville formation is composed of sandstones, hard coarse quartz conglomerate, and a few thin shale and coal beds. This formation forms a ridge around the Wyoming Valley coal basin and is folded into a series of small anticlines and synclines striking east northeast in the extreme southeastern portion of Luzerne County. Bedding is generally well developed in the area with crossbedding common in the sandstones and siltstones.

The available records did not have information pertinent to the characteristics of the bedrock. The records did indicate that most of the dam is founded on overburden.



PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DAM F

HAZELTON CITY AUTHORITY

GEOLOGIC MAP

MAY 1979

PLATE E-1